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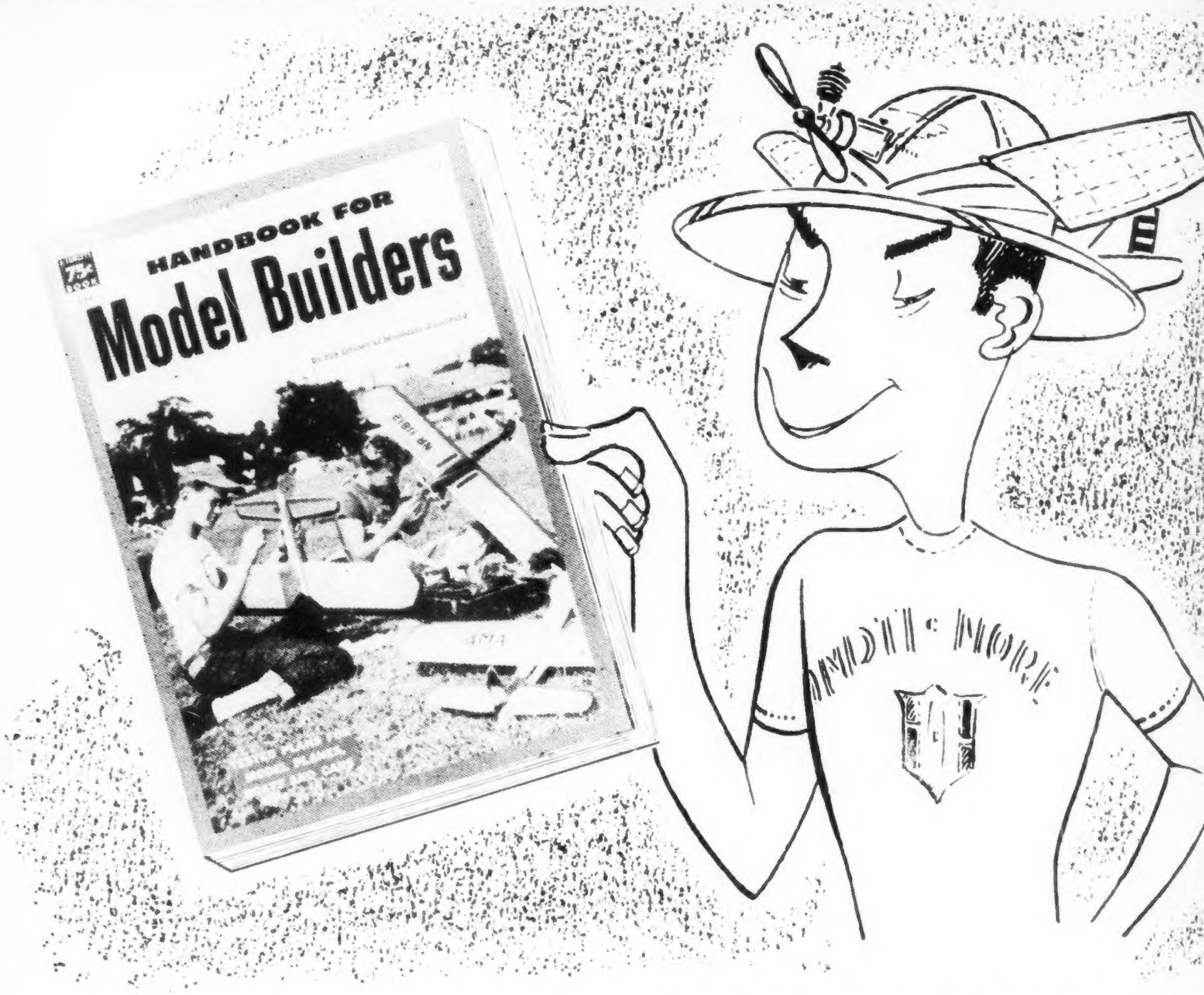

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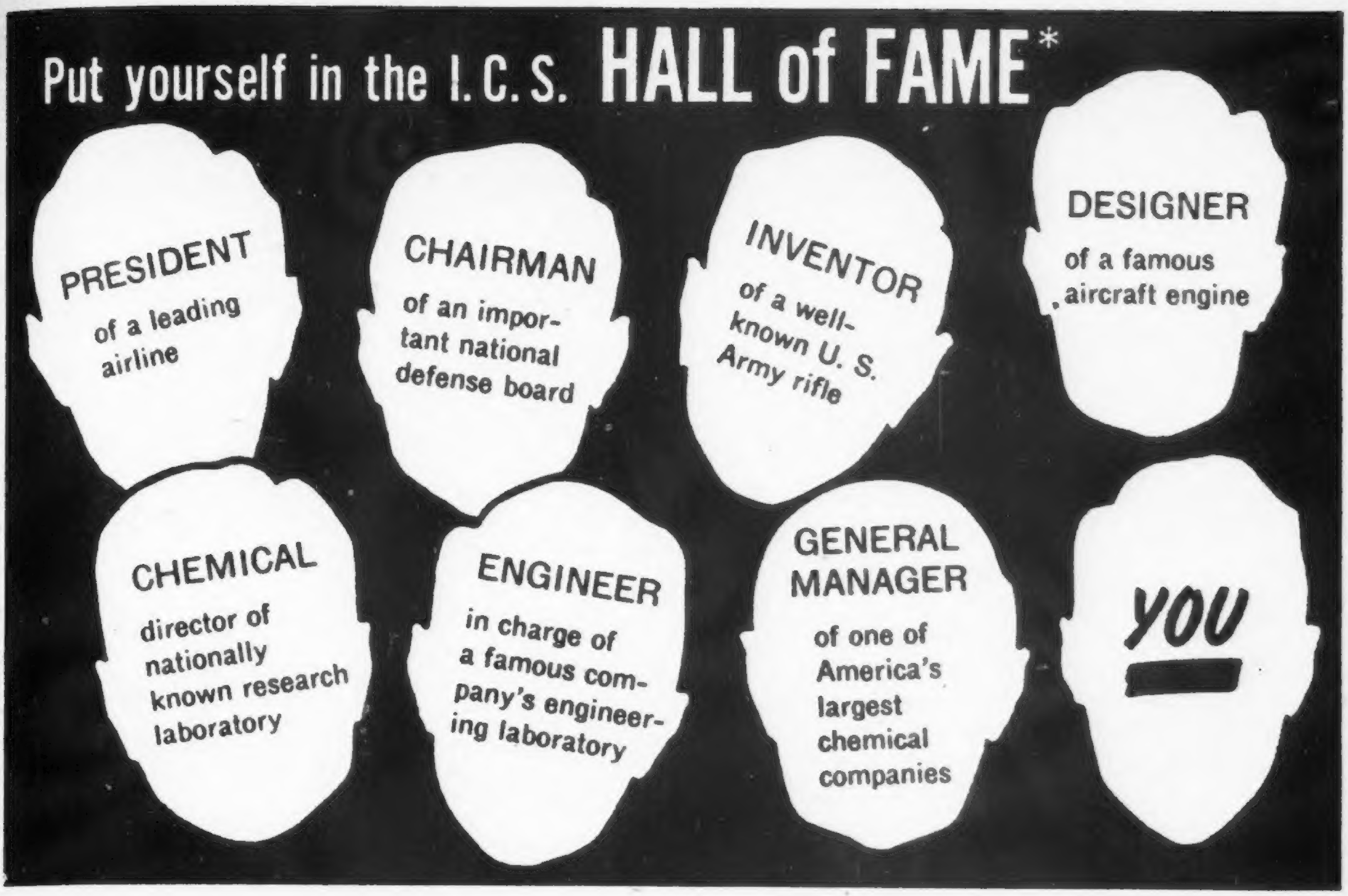
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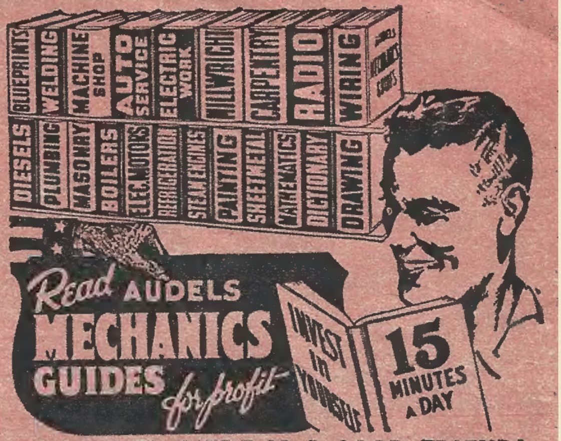

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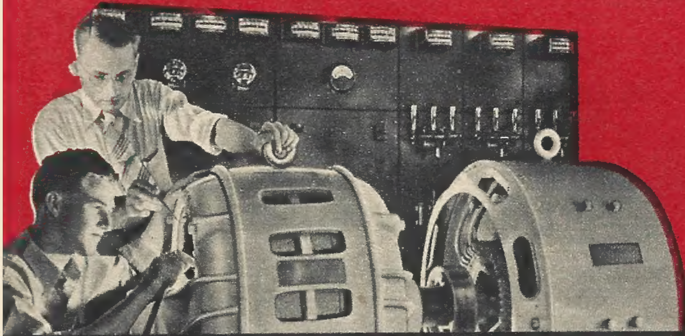

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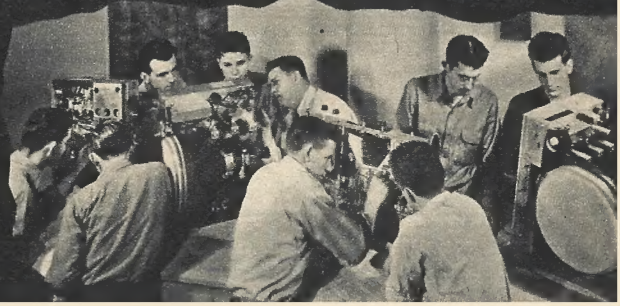
F.M.
(Frequency Modulation)
RECORD CHANGERS
AUTO RADIOS
PUBLIC ADDRESS Systems

(Right—Instructor helping students check the wiring and trace circuits of television receivers.)



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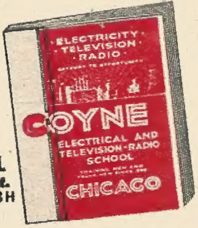

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Wintertime is wear-and-tear time on your car—unless you give your motor added lubrication protection. It's easy and economical to do this with Pyroil. Pyroil improves winter lubrication because it gives low viscosity oil the special added property of adhering to vital metal surfaces at all times. This clinging film of oil protects piston rings and cylinder walls. It assures "quick starts." It prevents damaging rust. It frees the engine of sludge and gummy deposits.

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I want my car to last and run properly. Please tell me more about Pyroil and how it can accomplish this for me.

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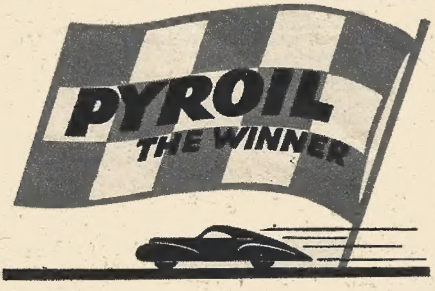
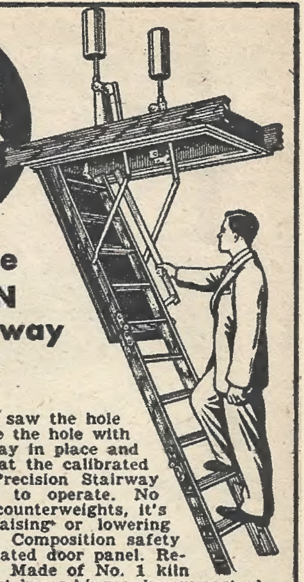


USE YOUR ATTIC



Install the PRECISION folding stairway YOURSELF

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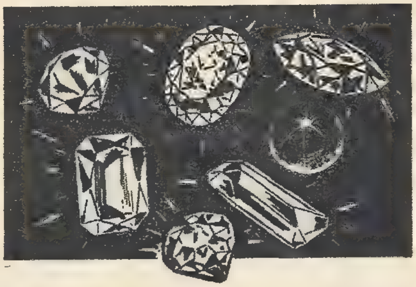
City..State...................

How To Stumble Upon A Fortune in GEMS

All Over the U. S. — Diamonds, Pearls, Opals, Garnets, Amethysts, Jade, Rubies, Topaz, Sapphires, Turquoise, Zircons, and Other Precious and Semi-Precious Stones Are Waiting To Be Picked Up



Here Is Exactly HOW And WHERE To Find Them

NEXT TIME you trip on a rock—examine it carefully. You may have "walked into" a real fortune.

Last year alone, over half a MILLION dollars worth of stones were found by week-end gem hunters. A youth pitching horseshoes in an open lot picked up a stone and kept it in his pocket for 15 years before he discovered it was the largest alluvial diamond ever found in the U. S.—34.46 carats in weight. Two salesmen went gem-hunting on vacation and found a small pocket of "Tourmaline," a semi-precious, crystal gemstone, worth $13,500.

Are You "Passing Up" REAL GEMS Near Your Home?

Valuable gems are all around us—half hidden by surface dirt and other rock. Perhaps in an abandoned quarry near your home, a river bottom, a rocky hillside, a beach, or an old cave. If you know WHERE to look and how to RECOGNIZE the more precious stones—you can enjoy an educational hobby that can pay off BIG.

Now you can enjoy and profit by gem-hunting—no matter where you live in the U. S.! Brand-new book, "Gem Hunter's Guide" tells all you need to know. Exactly where to find scores of precious and semi-precious gems. Where to find rich PEARL-bearing mussels. Complete town-by-town and gem-by-gem cross-index helps you plan week-end and one-day gem hunts. How to recognize each variety—clear photos of gems in their natural state make it easy. Simple tests you can give the rocks you find, plus 1350 locations where gem materials have been found all over U. S. A. and a special chapter on how to identify quickly 69 different and valuable gemstone varieties. Book is handsomely bound and contains over 200 pages packed with illustrations, photos, maps, charts, etc.

IF YOU FOUND THIS IN YOUR BACKYARD . . .

(as Wm. P. Jones of West Va. did)

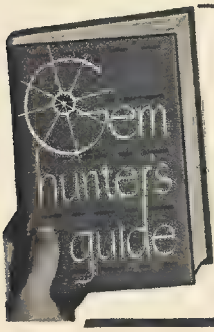
Would YOU Know It Was a 34.46 Carat Diamond? (see story at left)

10 Days FREE Examination Merely Mail the Coupon

SEND NO MONEY. Just mail coupon at once to examine book FREE for 10 days entirely at our own risk and expense. If you decide to buy the book, it may be the richest investment you ever made. In a single day, it may pay you back many thousands of times its small cost. So rush coupon NOW for 10 days' free examination in your home. *Science and Mechanics Magazine, Dept. 703, 450 East Ohio Street, Chicago 11, Ill.*

Do You Know That:

- Big, valuable, perfect Pearls have been found in many sections of the U. S.
- 48,000 Diamonds have been found in Arkansas alone?
- A Diamond weighing over 20 carats was found in Virginia?
- A vast region surrounding the Great Lakes possesses the greatest store of Diamonds yet to be found in the U. S.?
- Gem sapphires are found in Colorado, Idaho, Montana, New Jersey, New Mexico, and North Carolina.
- For every Diamond already found in this country, there are thousands more yet to be found?
- A cowboy found an Opal worth $280,000?
- Mid-west streams have produced as much as HALF A MILLION dollars worth of Pearls in a single year?
- A ten-pound Turquoise nugget—believed largest ever found—was discovered recently in one of our western states.
- Valuable Gems are discovered in all parts of the U. S.—even in New York City area?



TELLS YOU—

- How to identify over 69 different gem materials by hardness, composition, color, luster, cleavage, associated rocks, etc.
- Methods for classifying gems by families
- Where diamonds, pearls and rubies have been found in the U. S.
- A simple plan for finding and harvesting pearl-bearing mussels
- That gem quality emeralds may be found in Maine, Massachusetts, New Mexico, and North Carolina

—Also special illustrated portfolio of various gem materials in natural state

Science and Mechanics Magazine, Dept. 703
450 East Ohio Street, Chicago 11, Ill.

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Larry Campbell
Rex Ferris

Which One Paid Hundreds Of Dollars To Train At My Side? Rex Ferris, was a skinny weakling, paid a few cents to start building into a Champion All Around He Man! Larry Campbell paid me hundreds of dollars to train at my side years ago. Start to become an All-Around He Man at home with these same secrets for only a few cents —like Rex Ferris did!

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says George F. Jowett
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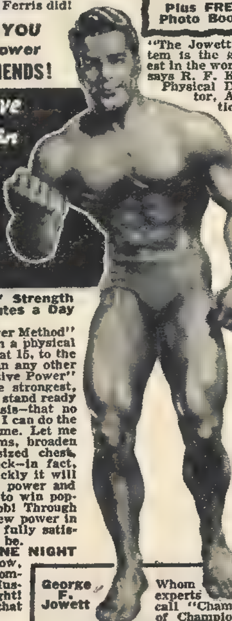

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I'll teach you the "Progressive Power Method" through which I rebuilt myself from a physical wreck the doctors condemned to die at 15, to the holder of more strength records than any other living athlete or teacher! "Progressive Power" has proven its ability to build the strongest, handsomest men in the world. And I stand ready to show you on a money back basis—that no matter how flabby or puny you are, I can do the same for you right in your own home. Let me prove I can add inches to your arms, broaden your shoulders, give you a man-sized chest, powerful legs and a Rock-like back—in fact, power pack your whole body so quickly it will amaze you! Yes, I'll jam you with power and confidence to master any situation—to win popularity—and to get ahead on the job! Through my proven secrets I bring to life new power in you inside and out, until YOU are fully satisfied you are the man you want to be.

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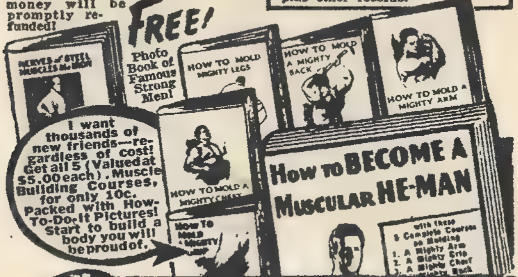
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with these 5 Complete Courses on Molding
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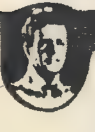

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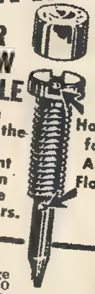
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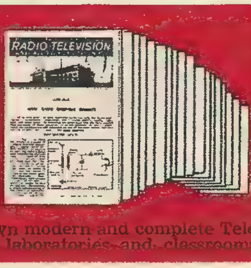

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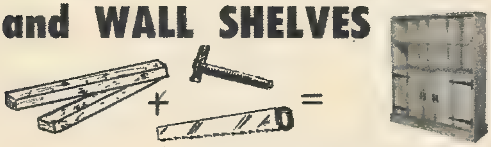

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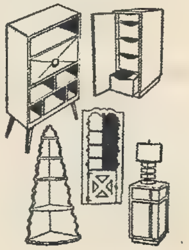

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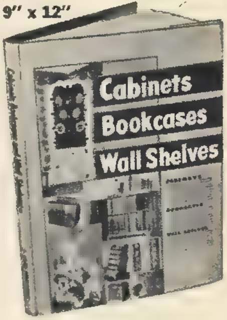

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750-16	6.96	710-15	6.36	32x6(8)	10.56	1200-20	18.56
550-17	5.96	760-15	6.56	32x6(10)	11.96	1000-22	15.56
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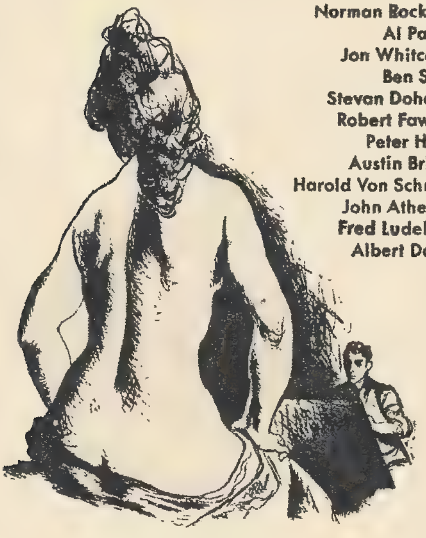

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Once upon a time—long before you and I were born, Buster—a young country sawbones whose name was *not* Dr. Jonathan Jones bought a car. The year was 1910. The car was a four-cylinder, 30-horsepower Cadillac "Gentleman's Roadster." It was a snazzy conveyance for its day, with more brasswork than a millionaire's yacht, a top that anybody could easily put up or down in half an hour, and a fancy horn you blew by squeezing a black rubber bulb. Young Doc Jones was very proud of his Cadillac, the more so because it took almost every nickel he had to raise the purchase price of $1800. He decided the day he got it that he would give this car the same regular, methodical care he gave his scalpels and his forceps and the other accoutrements of his business which was then, and for the next 40 years, primarily concerned with the safe and expeditious delivery of the new generation. He figured it was just good business to have *all* the tools of his trade in first-class operating condition at all times. And so he gave The Stork—as the familiar black baby-buggy soon became known to the Doc's many constituents—all the attention it is possible to give a car. He changed the oil when it needed to be changed and he kept the sparking plugs as clean as hounds' teeth and he washed and waxed the body and oiled the genuine leather upholstery frequently and as soon as something showed signs of wear he replaced it with a new something. After a while Doc Jones and his gas buggy got to be sort of a standing joke. "Why, he loves that old car more than he loves his wife!" folks used to say. He really didn't. But the Doc didn't even mind it a bit when some fresh kid in a brand-new convertible would rocket past him yelling, "Get a horse!" Matter of fact, the Doc kind of liked being considered a "character"—and he more than kind of liked his faithful, dependable, always startable 1910 Cadillac roadster. Its wood-spoked wheels, as high as a man's belly button, looked funny—but they pulled The Stork through many a country lane where another car would have bogged down. Its massive, noisy engine didn't have the high power and speed of newer cars—but it never failed to do the job the Doc asked it to do. Why? Because all through the years, and two World Wars, the Doc kept his promise to himself to maintain this car in first-class condition. . . And then one day in 1950 the old Doc up and died. And, as so often is the case with many a country doctor, there was barely enough cash in his "estate" to pay the funeral bills. About all his widow had left was a small amount of insurance and a house—and a 1910 Cadillac "Gentleman's Roadster," original cost $1800, present value unknown but probably not much despite its almost perfect condition. What happened next was as much of a surprise to the widow Jones as it would have been to the old doctor himself. A city feller whose hobby was collecting "antique" cars came through town one day and he heard about The Stork, which was now sitting in the barn for its first real rest in 40 years. He went around to look at it and when he saw the immaculate condition of the engine and the chassis and even of the original paint and upholstery, he felt like Columbus. He bought the car on the spot. The price? The good Widow Jones still hasn't recovered from the shock—but he paid her $1500 for it, only $300 less than the car had cost brand-new 40 years before. . . Well, that's all there is to the story. Except for the moral. Whether you do it yourself, or get a reliable mechanic to do it for you, it pays to take care of your car. Maybe you don't crave to keep *your* jalopy rolling for 40 years, the way Doc Jones did. But thanks to our dear pals the Russians, you've now got an even more potent reason than just plain sentiment for keeping your car in good shape. This year, new automobiles will be harder to buy. Next year—who knows?—they may be *impossible* to buy. So take a tip from Ye Olde MI Workbench: Care Will Save Your Car—and believe me, Buster, it's worth saving! . . . See you next month.—*Bill Parker.*

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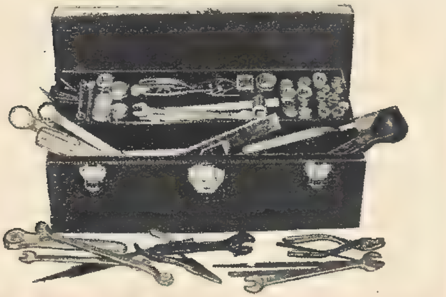

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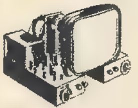

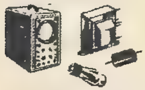

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Invention Clinic

Joseph H. Kraus

The Self Opening Envelope

"Why not a mailing envelope with a string enclosed so that all the person receiving it needs to do is grasp the string, rip the envelope open and disclose its contents?" That's a question that is asked often.

Frankly, we would like to see such envelopes in general use. Our forefathers felt the same way about it, if patent records are any sort of yardstick. Yet there is no widespread popular use of such a product even though its production need not violate any existing patents.

Early records show that our ancestors in many lands prized envelopes in which mail was received. This has helped many a stamp collector fill gaps in his collection by the purchase of old letters floating around in the attics of old homesteads. But today envelopes are looked upon as nuisances, generally to be discarded. Through the years, though, patents to improve them have been granted.

VIA AIR MAIL

Envelopener Corporation may have the answer to the self-opening envelope problem with this model which uses a double-chain-stitch of nylon-orlon thread.

Patent Variations

Back in 1858, Charles Phelps of Salem, Mass., obtained a patent for an envelope which "consists of a piece of cord of any suitable size and material laid in parallel with and attached to one of the creases formed by the folding of the envelope, and of such a length that it shall fill the said crease and project beyond far enough to be readily seized when its use is required.

"The operation is as follows: The sealed envelope being held with the projecting end of the opener toward the person, a pull upon the opener from the person and from the body of the envelope causes the cord of opener to tear itself out leaving the envelope open at that edge and otherwise uninjured, that it may be used as a case or protection for the letter after its perusal."

Instead of an internal string which might "slip from its glued attachment," Alfred L. Seabury of Norfolk, Va., proposed a line of thread stitching made with a sewing machine. Then, by grasping the end of the threads, the stitching could be torn away disclosing the contents. This method is used today on many paper cement, fertilizer and flour bags. It never became popular on envelopes for mail.

Whether the examiners of the Patent Office were as critical in the early days as they are today is a point historians might argue. However, a string along the narrow crease of envelope was also specified in a patent issued to Henry K. Gregg of Baltimore, Md., in 1871. To be sure, he included a minor variation—one or more knots in the end of the string.

In 1876, James Collins of Central City, Col., substituted a strip of parchment which ran through two slits near the top edges. The strip was folded back on the outside, printed with instructions to raise and pull. Paul Busse of Baltimore, Md., was granted a patent in 1883 for a gummed strip attached to the back right edge. When this was pulled away a strip of envelope came with it.

Philip L. Cuskley of Portland, Me., specified the use of small paper pieces extending beyond the top and bottom corners of the envelope across which the string was affixed on the inside. With this it was necessary merely to hold one paper tab while pulling on the other.

[Continued on page 24]

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Invention Clinic

[*Continued from page* 22]

A cord which was stitched through the top and bottom of the side of the envelope was the design for which Frank E. Munn of New York, N. Y., was granted a patent in 1897. A year later J. A. Lefferts protected the idea of letting the ends of the string project at top and bottom of the side so that either end could be pulled while the other was held securely.

A narrow strip of woven fabric or fibrous material either at side or top, and similar in a way to the extra strip on packages of cigarettes or gum, was the idea protected by Walter S. Timmes of Brooklyn, N. Y. in 1901. A zip string, similar in action to the loop of thread with which grandma used to split dum-

[*Continued on page* 38]

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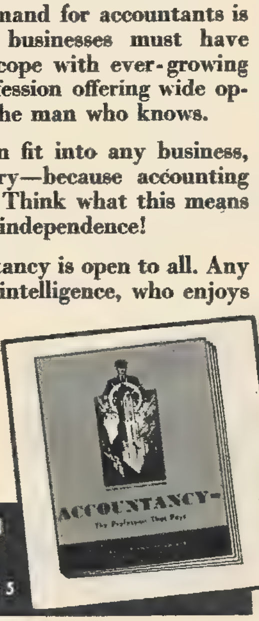

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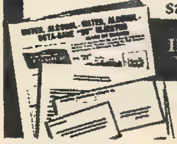

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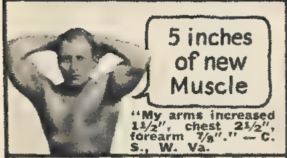

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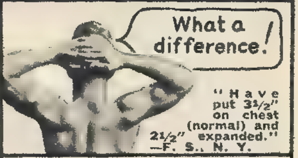
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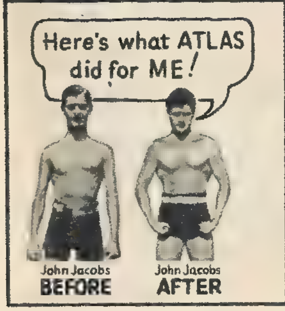
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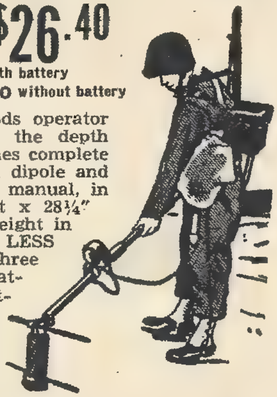

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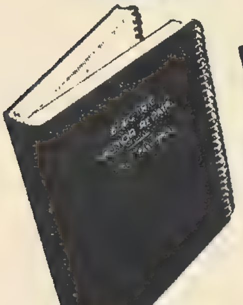

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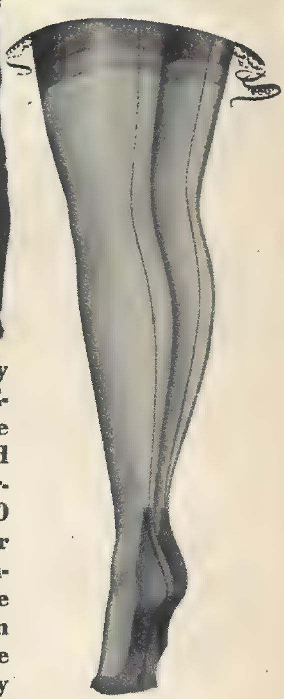

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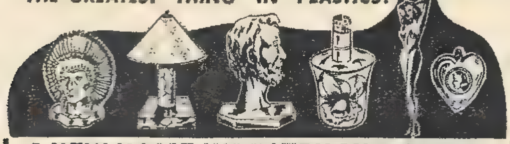

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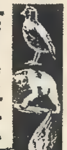

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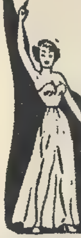

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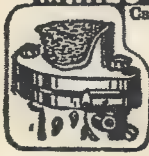

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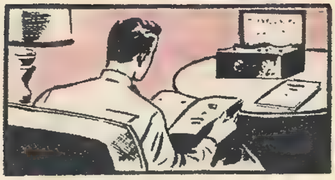

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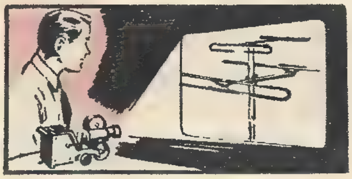

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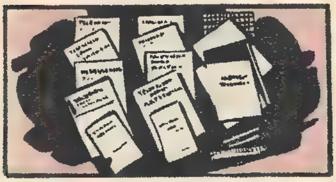

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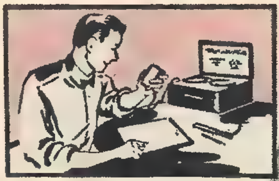

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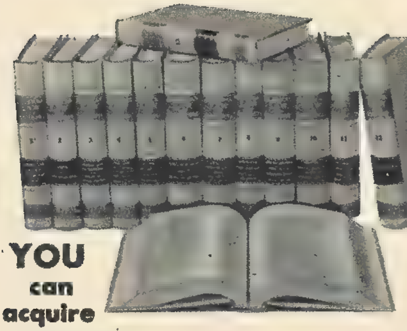

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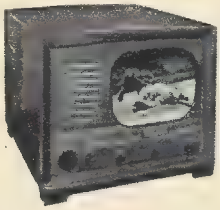

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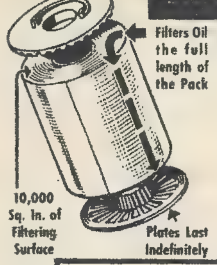
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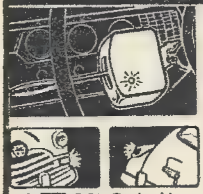

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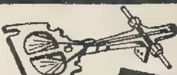

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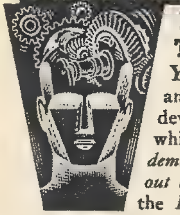

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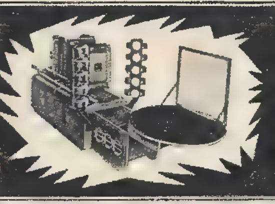

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Invention Clinic

[*Continued from page* 24]

plings, was the plan protected by Charles W. Wilson, of Linden, Oklahoma Territory, in 1904.

An advertising tab, attached to the string was the thought which influenced Louis Levy of Seattle, Wash., to apply for a patent shortly after.

From this point on the inventions appear to become more complicated and expensive to produce. There is the tear-out tab, the curved placing of the string, the multiple zig-zag string and even a V-shaped spring with coiled ends which projected the contents when the envelope was opened.

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[*Continued on page* 40]

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[*Continued from page* 38]

too, envelope manufacturers tend to stick to the established standards where a quick switch can be made from a "penny saver" envelope to a standard closed form.

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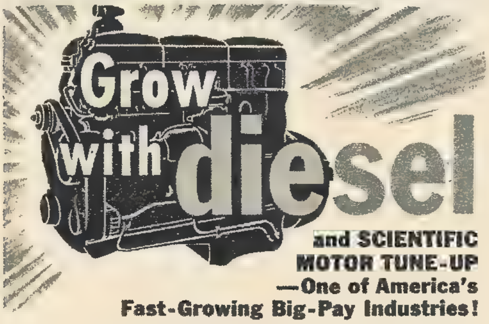

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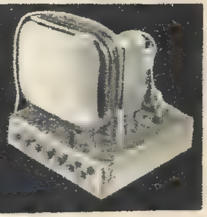

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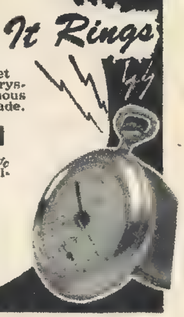

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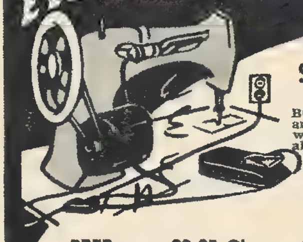

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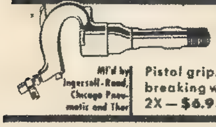
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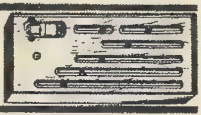

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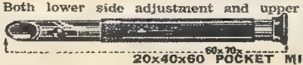

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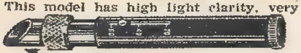

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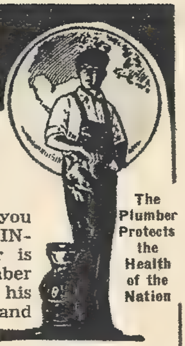
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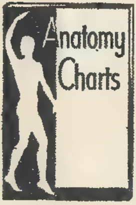

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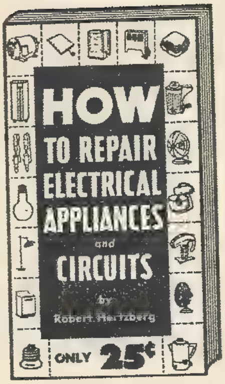

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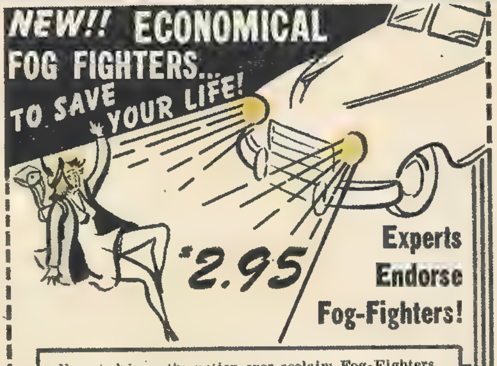
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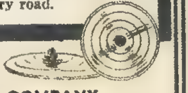

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SEE GOLDEN Hamsters ad on page 44. Shows picture of Hamster.

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mechanix
illustrated
February, 1951

SPRINGS
ub Soda
Soda

Millions From a Twist

Take an old invention, switch it a bit and you may make a fortune.

By Lester David

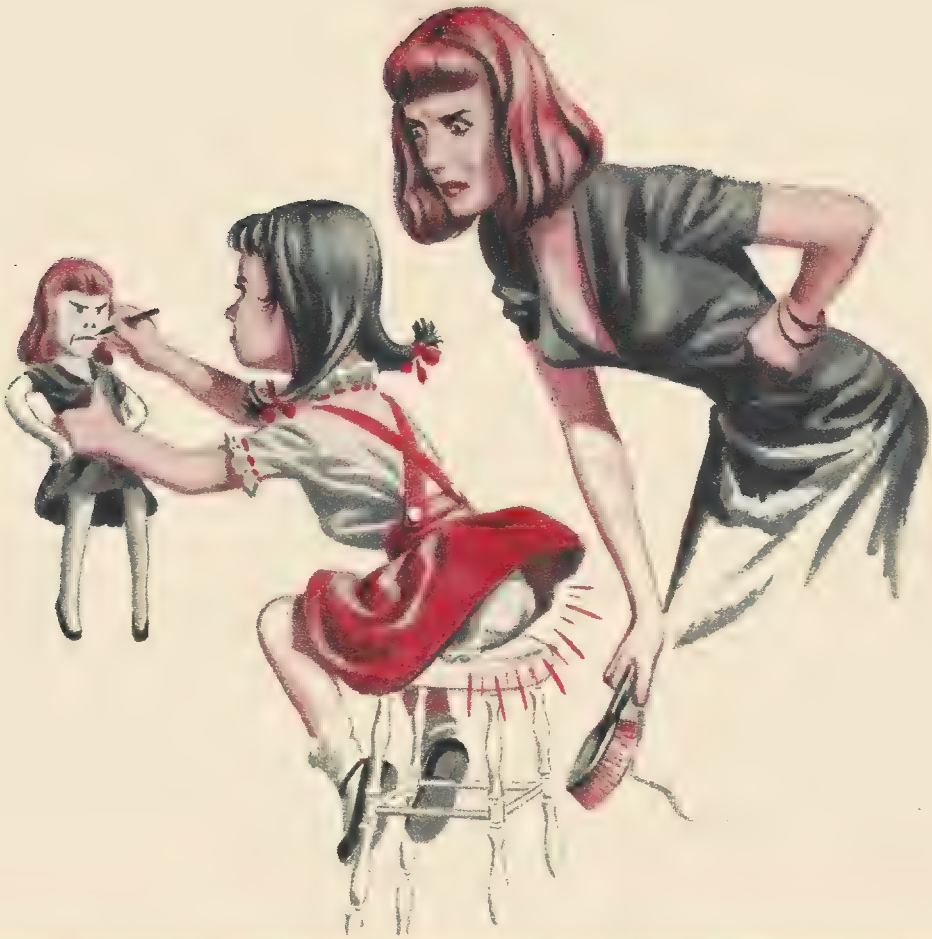
ONE scotch and soda proved to be a vital factor in helping the United States defeat Japan!

The incredible story, until now buried in official records, illustrates dramatically how

Children at New York's Lexington School for the Deaf play with Irving Brambier's popular Ed-U-Cards.

Mother of three children, Mrs. Marion Donovan devised a water-tight diaper cover for her babies.

Now baby is happy—and Mrs. Donovan, too. She runs a thriving enterprise selling the Boaters.



Nowadays if Mom's not nice to little Eva, the darling is likely to copy her angry face on a new-type doll called Scribbles.

a simple inventive twist—a little switch that nobody had thought of before—made a fabulous fortune and helped win a war.

When World War II broke out, the United States Air Force found that the B-29 couldn't fly higher than 28,000 feet because at higher altitudes the reduced pressure caused the gasoline in the tank to bubble. It could not be pumped through to the engines.

But the great superfortresses had to fly higher if they were to go into action. The experts tried everything but nothing would stop the ominous vapor lock. Then one day an aeronautical engineer was coming home on a train. In the club car he ordered a scotch and soda and absentmindedly stirred it with a swizzle-stick. The bubbles rose to the top and popped out and the engineer stared vacantly. Then suddenly the idea struck!

Why not put a swizzle-stick in the gas tank of a B-29? Why not a little spinner actuated by a motor inside the tank which would break the bubbles loose?

Next day he began work on a booster pump and before the year was out, every superfortress of the United States Air Force went into battle carrying a "swizzle-stick" in its gasoline tank.

There's a lesson in this story which inventors now plodding along the high road to fame and fortune can't afford to overlook. You don't have to come up with a revolutionary invention in order to make big money. Very frequently a little twist is the answer to a puzzle which has baffled the best scientific minds. Newer, easier and better ways of doing old things are the most avidly sought-after ideas in the field of invention today.

Claude Putnam, ex-president of the Na-

Inventor Roger Hamilton, using the boomerang as inspiration, devised a toy called the Zoomerang.

It's a plastic coil which always comes back when hurled. Here, his youngster tries out three of 'em.

tional Association of Manufacturers, whose 15,000 members produce 85 per cent of the nation's manufactured goods, told MI:

"Some of the most useful and biggest money-making ideas are so simple one wonders why they weren't discovered long before. Young inventors sometimes succeed where others have failed because their fresh approach enables them to see an easy, economical way of making a product which previously called for a complicated and costly process.

But how do you go about finding a million-dollar twist? Where are they hiding?

You can find many examples of twists in the history of inventions, but let's look at recent ones dreamed up by today's crop of Edisons and Marconis. The average Joe in ordinary circumstances, equipped with nothing more than a fertile brain and a desire to get something done, can and has dipped his fingers in gold today!

How did these bright people do it? Let's take a multi-million-dollar stroll through town. Get your hat and come along.

Okay, we're starting out on the main drag. See those parking meters into which drivers insert coins for the privilege of parking up to an hour? There has to be a meter for each car. Do you see a twist? Richard I. N. Weingart did.

"Why," thought Weingart, "must there be a separate meter for each automobile? Why can't someone—me, for instance—devise a machine which would do the work for the whole block?"

It was a challenging thought and Weingart went to work on it. After months of intensive work, see the result. It's a new meter, a little bigger than a fire alarm box, to be installed at the end of a block. And here's the switch—it can issue tickets for legal parking to 1,000 cars at a time, eliminating the need for rows of individual stanchions and thereby saving communities hundreds of thousands of dollars.

Here's how it works: the motorist parks, inserts a coin and gets a ticket with the date and time punched on it. He puts the ticket inside the window of his car and goes off. The meter can be rigged to allow any specified length of legal parking for any amount of money and can even be regulated to allow all-night parking in outlying areas.

But let's keep walking. We're still watching the cars for those jackpot inspirations. Many now have clutchless drives. What's a driver to do with the foot which ordinarily goes on the clutch?

The Curtman Company of Kalamazoo, Mich., did some thinking about it and came up with an arm-pedal arrangement attached to the brake pedal on clutchless cars. Advantages? Faster breaking as well as something for the left foot to do.

Looks like this walk is going to take longer than we thought, so let's hop into that drug store and telephone home that we'll be a bit late. We're speaking into the mouthpiece now. Did you ever consider how many respiratory diseases are transmitted by phone? If you use a phone right after someone who has a cold, chances are even you'll come down with a sniffler too. Can't something be done?

Something definitely could, thought Roy L. Lewis of Atlanta, Ga. He invented a "protecto germ trap," simply a plastic mouthpiece designed to hold a disc-shaped paper filter. Idea is to pull out the old filter and replace it with another just before using a strange phone. "You just throw the other fellow's germs away," explains Mr. Lewis.

Let's get on our way again. Look carefully at the women passing by. No—we're watching *hands!* Notice the unsightly bulges on fingers where the gloves have been drawn over rings. Bet the gals fume and fret over this. The rings, particularly if they have sharp stones, pull the gloves out of shape and even tear them, not to mention the fact that lovely gems, which women love to show, are always hidden under gloves.

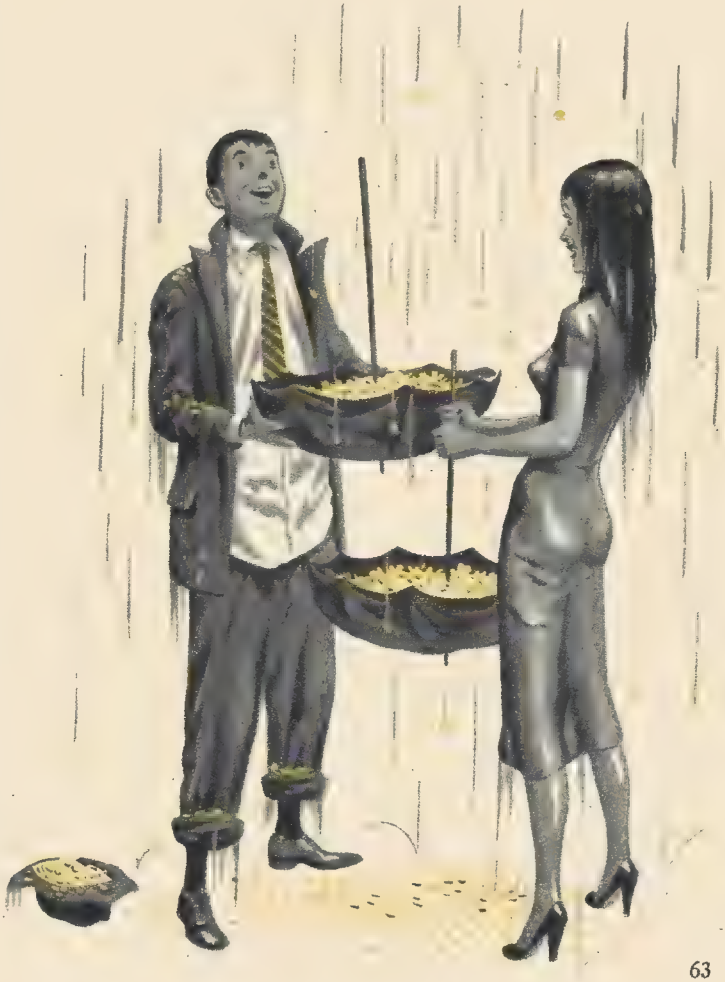
Does an inspiration dawn? It did for Tina Lazar, a beautiful, dark-haired former model of New York City. One day Miss Lazar noticed with irritation that a projecting ring had torn a brand-new pair of black gloves. But the stone gleamed so brightly against the dark background that she tore the glove some more. It looked elegant! She put button-hole slits on the backs of the glove fingers, crocheting around them with elastic thread so that the slits would close neatly and invisibly when there was no ring on the finger. Uncle Sam issued a patent to her and the offers came rolling in. People have been making gloves for centuries, but it took a pretty girl who had never invented anything before to give them a unique twist which may earn her a fortune.

We're on our way again. Now we're passing a bunch of kids who are playing in the street. Some of the most lucrative inventions of the past decade have been angled for the toddler set. Perhaps in no other field does the twist enter quite so importantly.

Look, for instance, at those little girls playing with their dolls. There are dolls that wet, dance a minuet, blow soap bubbles, cry real tears, sip liquids through a straw and say their prayers. You'd think that almost anything which can be done with a doll has already been created in someone's workshop, but you're reckoning without Elvy Kalep. She thought up an amazingly simple little switch which is captivating kids all over the country.

No matter how a child dresses a doll, Miss Kalep reasoned, she cannot change the face it had when

[*Continued on page* 172]



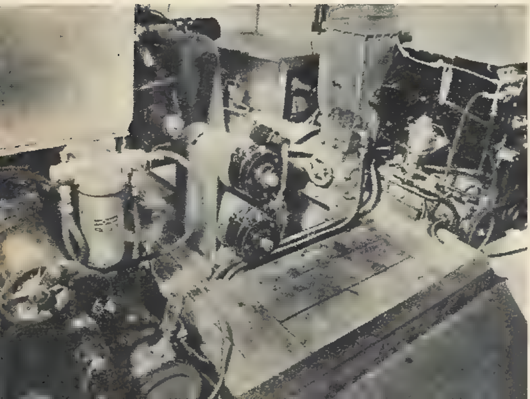
Cheap, disposable umbrellas, the idea of a husband-and-wife inventive team, are now catching a fortune for the very ingenious couple of gadgeteers.

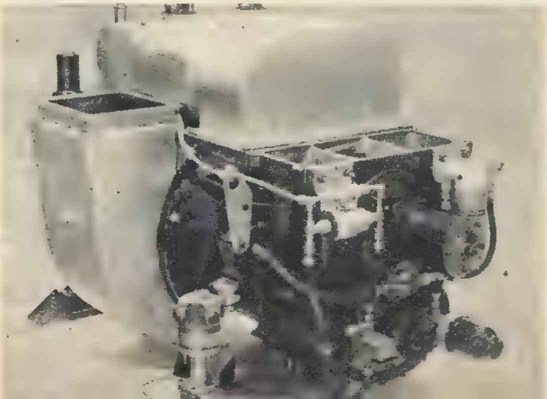
NEW in SCIENCE

Water-Cooled Gun, right, made by Russians, was discovered in a cave near Wonsan, Korea, by the U. S. Marine Air Wing. Here, PFC Woodward Nance of Little Rock, Ark., inspects the ammunition found with this machinegun-on-wheels which is reminiscent of the old American Gatling gun.

Safety Cigarets, left, will protect you from flying bullets assuming, of course, that they're surrounded by the new armor-plate case made by the Spooner Armor Co. at 50 Broad St., N. Y. C. The case is capable of stopping shrapnel and mortar fire, too. That's Mr. Spooner, "most shot-at man in America," testing it.

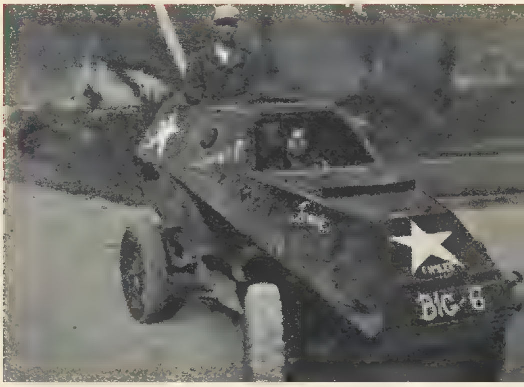
Double Gas Turbines powered the 60-foot launch, right, in a recent test of the Rover engines on the Thames River in England. Two units like the one, below right, were mounted side by side, below left. Two exhausts belched smoke as the 100 to 120-hp units went through their very first trial run.





Cat's Eyes For GI's are now provided by the U. S. Army Engineers who have developed infra-red night-seeing devices. Sniperscope, above, mounted on carbine, picks up images in dark. Infra-red binoculars, left and above left, allow the driver to make over 30 mph in total darkness.

Russian Jeep-Tank, right, is the Red BA64, a light armored car which the North Koreans made good use of. The two-man vehicle operates with one soldier driving and the other standing guard in the rear. Here Cpl. Harvey L. Stoner of Plainville, Kan., drives while Cpl. Wilner Dungelman of Bridgeport, Conn., stands.



Penicillin Gloves, left, are used to protect both the workmen and the drug as chrystalline penicillin is packed in bottles inside sterile over-pressure boxes which are irradiated by ultra-violet lamps. The worker places hands and arms in the long plastic gloves in the Frankfort, Germany, laboratory.

World-a-Minute Men

Unlike the big one we're living on, a world at the Replogle Company of Chicago is never in bad shape. Here is a mountain of new ones.

Naked half worlds are punched out from steel disks by this press but it takes the cartographers' ancient skill to clothe the hemispheres.

To make one world, an inner lip is welded to one hemisphere, then the two are joined with waterproof cement. The seam is ground smooth.

After cartographers transpose map data onto spherical sections called "gores," experienced workers cut them out by means of a template.

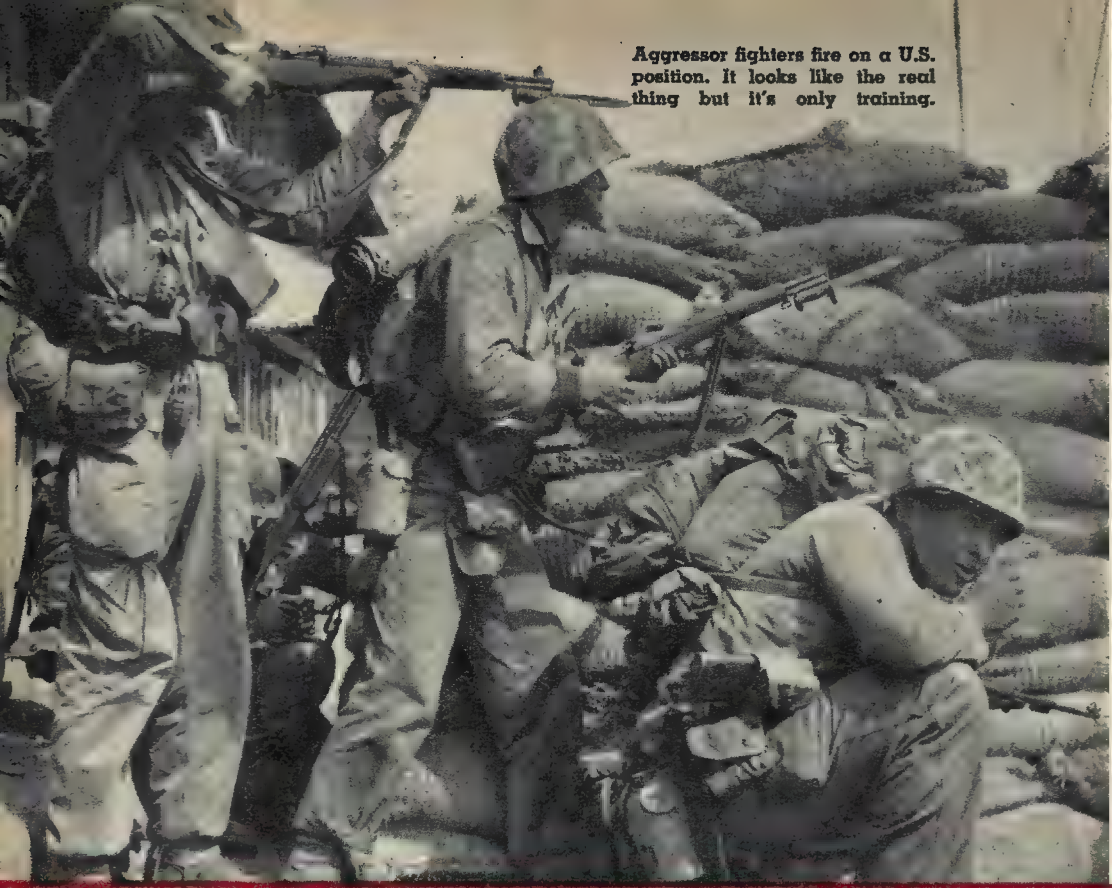
Next, the map segments are pasted onto the globe so that the edges are virtually invisible. This task is one of the tricks of the trade.

Now it looks like a globe and as it spins 'round it gets a coating of clear lacquer. It's painted inside an exhaust hood which carries off fumes.

These gals take care of the final step in globe making—the suspension of the world on its axis. The exact polar inclination must be observed.

Some globes are built from cardboard segments rather than paper-on-metal. These are pressed into hemispheres and later the halves are joined.

Real fancy globes are made of glass, with an electric bulb providing illumination from the inside. Work on these worlds is very delicate.



Aggressor fighters fire on a U.S. position. It looks like the real thing but it's only training.

AGGRESSOR TRAINING Pays Off In Combat

AN excited Puerto Rican woman clutched the sleeve of the American infantry captain and pointed to a man wearing a forest-green uniform, three gold leaves on each shoulder and a high comb helmet.

"Capitan," she said, "that man scares me. He looks like an enemy."

"You've guessed right, Senora," replied the captain. "He *is* an enemy—the U. S. Army's private enemy."

For the past five years the most ambitious, vicious, smartest and best trained enemy force in history has been plaguing our military high command. Not once but ten times it has struck with great power and cunning in gigantic air and amphibious assaults on our most carefully guarded hemisphere defenses. Thrice it has penetrated Alaska and in addition has landed at strategic positions from Hawaii to the Caribbean to Germany and from California to Florida.

Who is this foe who always invades and forever threatens? He's part of the Aggressor Force, created by the U. S. Army to make tactical maneuvers more realistic.

In 1946 the Army ground forces developed the idea of a maneuver enemy and the basic concept was tested by the Sixth Army. This was Exercise Oilskin, held at Camp Pendleton, Calif., and in it the Aggressor demonstrated his worth as a training aid.

As a result, by the summer of 1947 a regular Aggressor force was developed at

This is the real thing. Here Aggressor-trained American Marines fire on the retreating enemy in North Korea.

Meet Uncle Sam's Private Enemy No. 1—the best-trained practice foe in military history.

By James Nevin Miller

Fort Riley, Kan., for use as a mythical enemy in the field. It was planned that the personnel would change after each operation but the basic identity of the Aggressor force would not.

So, first came the creation of a fictitious Aggressor nation. Its ideology and political history were carefully worked out. Even a regular organization of its armed forces, including field manuals, was planned.

Army clothing was dyed green and with the addition of colored cloth tabs and adaptation of U. S. insignia (such as the use of the crossed sabres of the cavalry to denote rank rather than branch) provided a distinctive uniform for Aggressor Force. Addition of a wooden "comb" to the U. S. helmet liner gave it a peculiar silhouette which further set the mythical enemy apart.

Regular Aggressor equipment was provided. It included full-size inflatable rubber models of U.S. guns, tanks, half-tracks, armored cars, trailers, liaison airplanes and other material used during the war to deceive the enemy as to American equipment.

Pyrotechnic and sonic devices were developed to lend flash and sound realism to the mythical enemy. These included artillery flash simulators, firecrackers which imitate booby trap and land-mine detonations, simulated hand grenades and blank ammunition.

With this equipment the relatively few Aggressor forces can simulate a much larger army. Incidentally the enemy is get-

Aggressor troops, above, capture an enemy squad during Exercise Tarheel in 1949. Below, American troops faced the same type of situation when Chinese Red enemy hordes invaded North Korea.

It's only a rubber howitzer, above, manned by Aggressor troops. But below it's real American artillery in action in support of United Nations ground troops on the battlefront in North Korea.

ting larger all the time. The original concept of Aggressor was as a medium-size foe for realistically portraying only Army war games and the Navy didn't then enter the picture. But in recent months, the size of the mythical enemy has expanded to include the Navy, Marines and Air Force, too.

The Aggressor force has proved especially valuable because it makes the individual soldier realize that he is a vital part of the maneuver. Situations develop under closely simulated war conditions which challenge the ingenuity of all leaders. Decisions are left solely with unit commanders at each level in order to develop the leadership of the individuals concerned.

First of the big postwar Arctic training games involving a campaign against an invading Aggressor was Exercise Yukon, held at Big Delta, Alaska, 100 miles southeast of Fairbanks. This program paved the way for later exercises of gigantic size designed to protect Alaska from an invading force.

Although some military experts regard Exercise Snowdrop, held in 1948 at Pine Camp, N. Y., as only an airborne combat-team exercise, actually it rates as one of the largest and most important of the early Aggressor operations. Like Yukon, but on a much larger scale, it showed how an airborne attack, comprising a complete airhead operation, could defeat a mythical enemy under Arctic conditions.

Culminating three months of tough training, the maneuver started with a mass jump of 480 men from 18 flying boxcars over a frozen drop zone. Next came artillery attack in the deep snow, an eight-mile forced march and an attack by Aggressor. Besides the paratroopers, personnel in the operation included four infantry companies, an artillery battery and an engineer group.

Later that year it rained parachutes at Camp Campbell, Ky., when 2,200 paratroopers floated to earth in Exercise Assembly. Some 30,000 men and 195 aircraft participated in the 20-day war games. In 1949 there was only one major maneuver featuring Aggressor—Exercise Tarheel, involving 26,000 troops in the Fort Bragg—

Pneumatic "Sherman" tank, above, with Aggressor insignia on sides, prepared American troops for actual fighting in Korea, below, where an M-26 tries to spot enemy mortar fire in the Pohang sector.

Camp Mackall, N. C. area. Here the mythical enemy was blasted out by aerial means, very much after the pattern outlined at Exercise Assembly.

Exercise Sweetbriar, first war game of 1950, conducted near Whitehorse, Yukon Territory, Canada, had unique features. It was the largest simulated air assault ever undertaken under midwinter conditions in the sub-Arctic—involving 5,000 American and Canadian air and ground troops operating as a unit. History's longest airlift—3,000 miles—was utilized when 700 U. S. soldiers, armed for action, were airborne in 100 planes from Colorado Springs to Whitehorse.

The mission of this exercise was to repel an airborne invasion of Alaska by Aggressor. The Allied Force assembled at Whitehorse for a counter-attack on the enemy. On D-Day it struck successfully at enemy troops approaching the Alcan Highway by air and motor convoy. Climax of the exercise was a mass jump by Canadian paratroopers at Northrop Air Field in eastern Alaska.

Exercise Portrex, held near Puerto Rico in 1950, was the first exercise to test an Aggressor equipped with a navy and air force as well as an army. It had other distinctions—it was the largest peacetime maneuver ever held, involving 80,000 troops, and it was our first combination airborne—amphibious exercise overseas.

A typical cloak-and-dagger incident occurred during this exercise when PFC Donald R. Hyatt, an Aggressor secret agent, disguised himself as a U. S. Marine Second Lieutenant. His mission was to destroy the headquarters of the U. S. Forces.

To fulfill his mission Hyatt needed a jeep. Since the base of the Aggressor underground operation was within 200 yards of the landing beaches and about two miles from the actual lines, Hyatt found it easy to walk out of a swamp and wait for one on the busiest street.

In a few minutes a Marine Corps jeep arrived, laden with vital radio equipment in addition to its sergeant driver and a GI passenger. These two Marines had the misfortune to stop and ask for directions to their destination.

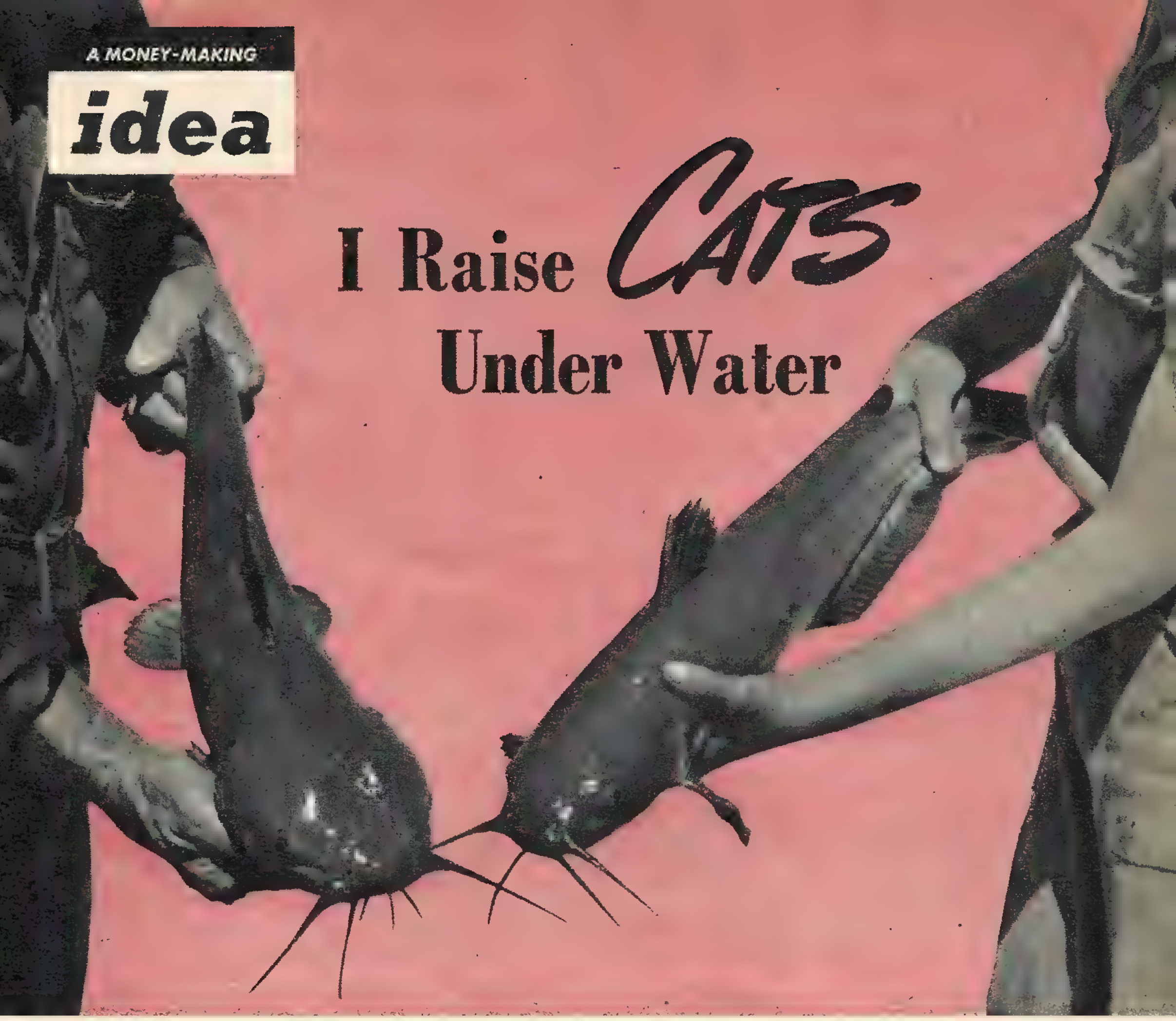
[*Continued on page* 170]

Battle sounds are simulated by this machine and broadcast to the training troops so they can "fire" in the direction of the sound throw.

A MONEY-MAKING

idea

I Raise CATS Under Water



Not only are bewhiskered catfish good eating—they're good business as well.

By P. H. Hill
as told to Gordon L'Allemand

ON a 640 acre farm in Arizona, I run the only commercial catfish-raising plant of its kind in the world. How did I, an auto dealer in Abilene, Tex., get started in this strange business?

Well, two years ago my friend Marcus Harwell drove out to California and Arizona and came back bubbling over with fish-farm plans. He had seen the fabulously rich flat delta of the Colorado river below Boulder Dam—hundreds of miles of flat land, bountiful water, no more dangers of flooding.

Marcus' enthusiasm led us to drive out and look over the layout. We found rich brush-covered land on the Mojave Indian Reservation. It had never known the plow—only coyotes, deer, wild horses, burros and Indians. We conferred with the Reservation authorities and they looked favorably upon a long-time lease.

So, in March, 1949 we started laying out plans for 60 ten-acre lakes, several three-acre culture ponds and two half-acre spawning ponds for 100-pair catfish breeding pens. We laid out canals, put in piping and pumps, built our administration center and put in a foundation for the large frozen-food-locker plant we were later to buy and install. We were too late to get started for

Head catfish expert Ernest Pockrus, above, examines a handful of egg spawn and bottom mud. Below, he checks the spawning can in a breeders pond. Center pool is year-round home of the cats.

Algae and fertilizer in foreground of spawning pond, above, sink to bottom and become food. Below left, Pockrus holds a female brooder while his youthful helper Charlie White holds the male.

the 1949 Spring spawning season—but we prepared for 1950.

Now we have 12 of the ten-acre lakes constructed and filled with eight feet of water. Each of ten of these holds 12,500 six-inch channel catfish fingerlings from our early 1950 Spring spawn hatch. We have acquired 150 pair of fine stock channel catfish weighing 4 to 16 pounds each. They cost us $1 a pound and now we wouldn't sell them for $10 a pound.

Is there really a market for fresh and frozen catfish? The channel catfish is the tastiest fish I know—and that includes trout. Of the three United States varieties—channel, blue, and yellow—the channel is by far the best flavored and has the firmest meat. Some 18,000,000 pounds of wild catfish are marketed yearly in the United States. Caught in Texas, Florida and Louisiana they are sold in Eastern, Southern and Western markets.

I have orders on my desk from Los Angeles fish wholesalers for four tons of fresh catfish a week. We believe that the Los Angeles market alone can absorb twice our 1952 planned million-pound output.

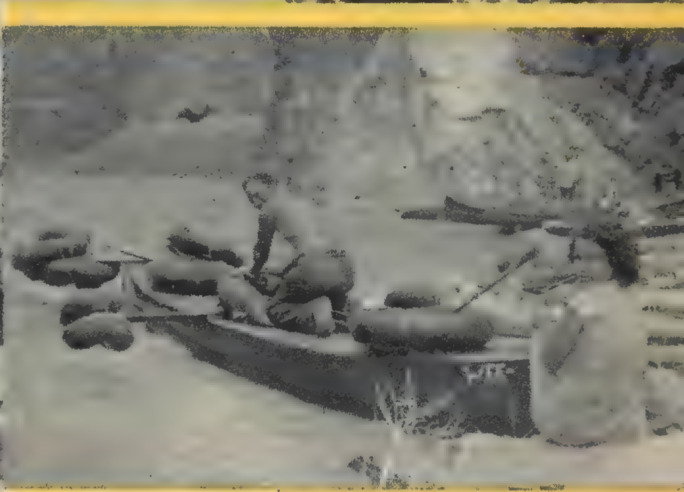
A nationally known frozen-foods corporation also has offered to take our entire planned annual output. We will probably operate through them but have been holding off to study the fresh and frozen-fish markets. It takes a year for catfish to reach the desirable market size of three-fourths to a pound-and-a-half. We will have our first fish to sell in the late Spring of this year.

Raising catfish is reasonably easy if you know the habits of the fish. You can raise them commercially or for farm food fish in most of the United States except in high mountain country with cold water. Main trick is to mate your pairs. Four to six pounders are the

[*Continued on page* 187]

World's Toughest Boat Race

This section of Wind River Canyon looks peaceful enough—if you're not trying to shoot the rapids in a flimsy boat.



Hollywood stunters Mr. and Mrs. Buell Johnson rig their boat in preparation for the run.

Second place winners A. K. Reynolds and Mike Hallacy made it in a boat used on the Green River cataracts.

Try entering this Wind River classic—but only if you have a wreckproof craft and a reckless nature.

By A. D. Nunn

"TO hell with the boat—get me off this rock!" yelled Ted Rumstead. He'd given up any chance of salvaging the canoe in which he was trying to catapult over the rapids of that furious torrent known as Wind River.

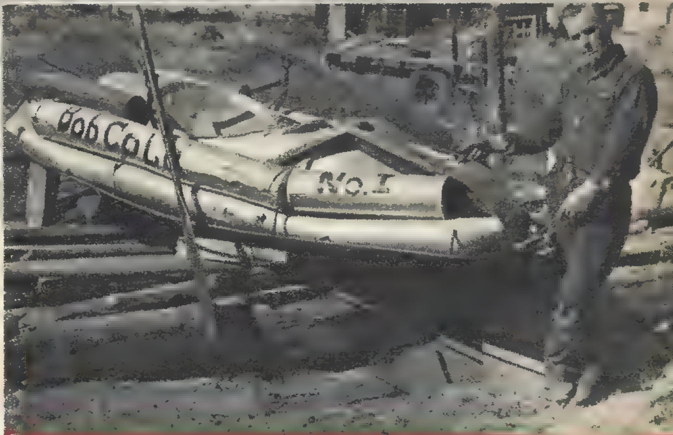
The occasion was the annual White Water Boat Race sponsored by the Rod and Gun Club of Thermopolis, Wyo. And Rumstead was finally lassoed by a cowboy and towed to shore unable to finish this classic race which for sheer recklessness of contestants is out-distanced by no other sport.

The rapids of Wind River are called "white" water but except for the white caps, they are anything but white. Laden with silt, the water is heavy and reddish

Believe it or not, Tommy Reed managed to finish the hazardous race although he didn't win a prize.

Winners Aubrey Lynch and Arnold Blanton, center, receive $1,000. At left is founder Smith.

Wearing a lightweight rubber suit Bob Cole shoots the Wind River rapids.



Cole's boat is basically a jettison tank from a P-38 divided into many buoyant air compartments.

brown. During the 12-mile span of the race, the river falls 1,000 feet, roaring through a crooked gorge, over a boulder-stacked bed, in and out of whirlpools of unknown depth. Waves reach as high as 12 feet. On Memorial Day when the race is held, the river, which is fed by melting mountain snows, is as cold as it can be and remain mobile.

The man who thought up this startling contest is Jean Davis of Thermopolis, president of the Rod and Gun Club. Everyone used to say that shooting the rapids of Wind River was an impossibility. But Davis likes to tackle the impossible so with Sonnie Reese and Tom Sparks helping him, the first race came off in 1948.

Starting point is at the south portal of Wind Canyon; the finish at the Wedding of the Waters where the Wind calms and becomes the Big Horn. The rules of the contest? "No one under 18 may enter. Each crew is limited to 2. Contestants must wear reliable life preservers. There will be no portages of any kind. Assistance from non-contestants not permitted. Any type boat (anything that floats) is admissible; but no mechanical power, other than poles or oars, may be used. Every precaution will be taken to prevent accident and injury. However, each applicant enters at his own risk." Entrants pay a $25 fee and first prize is $1,000. Second prize is ⅔ of the fees collected and third prize is ⅓ of the fees.

Beginning at 1 p.m., boats start at five-minute intervals. As fast as one boat is brought up to the "hitching post," tied with its own string and then cut loose, another falls into place until all have been launched. A late start is no handicap, since judging rests upon time per boat, not upon relative positions at the finish of the race.

Every kind of boat, from the finest of custom-made products to the queerest of home-devised contraptions, have been entered. All are carefully chosen by the contestants to meet the hair-raising ordeal—for that is what the race amounts to.

One of the most startling looking craft ever entered was a surfboard with inflated inner tubes lashed to the top and bottom. One of the two operators sat in the middle and rowed; the other lay on his stomach at the rear end of the board and kicked the waves. Incidentally, this human propeller took a severe pounding in his face which was just above the water and got full impact of the mutilating throw. But it didn't last long for the board went to pieces at the end of four miles.

Another entry consisted of 4x6's covered top and bottom with 2x12's. This raft, with its extra-heavy bolting, appeared to be practically indestructible but it was ripped apart when it hit Pink Canyon, the most treacherous span of the run. The two youths on the raft were beaten under it and almost killed.

H. W. Boyse entered the race with an outfit made of a couple of railroad ties bolted together at one end and left loose at the other. He lay face down on the ties with his legs and arms around it. But he got only 600 feet from the starting point when the ties splintered and he had to swim ashore.

Bob White entered with a canoe reinforced inside and out with inner tubes. Plastic outriggers, wound solidly with rope, were also used. This boat was a shambles at the end of eight miles.

In last year's race one of the weirdest entries so far devised was entered. It was the brain-child of Willard and Frank Raugh. They welded 16 carbide cans together and flanked them with pontoons. They did all right too, although the boat was upside down half the time. Toward the end, Frank landed on a boulder, but Willard brought their craft in, winning third place. Time: 1 hour and 46 minutes.

The entry which came in first last season was a decked canoe reinforced with aluminum and equipped with seven inner tubes. Four of these, from truck tires, were on the outside of the boat; three smaller ones were stuffed inside it. When half-way down the course the heavy canvas used to keep the water out was ripped apart. After that the boat stayed full—when it wasn't upside down, that is. Naturally, this slowed the speed. Even so, operators Arnold Blanton and Aubrey Lynch came through in 1 hour 37 minutes and 57 seconds.

They were seven minutes ahead of the second prize winners, A. K. Reynolds and Mike Hallacy. A lead over these two was a victory in itself for they make a business of taking passengers over the cataracts of Green River and were using one of their best boats.

It's anybody's guess as to what kind of a boat can best [*Continued on page* 189]

Canvas kayak reinforced with inflated inner tubes began the grueling 12-mile white-capped course.

However, it quickly capsized. Two weeks later the wreckage was found a mile down the river.

Roosters and hens don't know it but their feathers make glamorous wigs—blonde ones from white leghorns and red ones from Rhode Island Reds.

Feather Merchants

You can change ordinary poultry plumage into everything—from fertilizer to fire extinguishers.

By Lee S. Edson

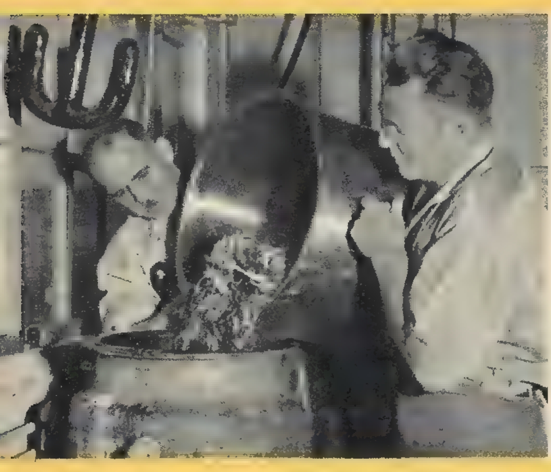
GET a big pot of boiling water and a mess of chicken feathers. Mix, stir gently, add a little know-how—you're a feather merchant!

No, we haven't been smoking opium. It's all the result of recent work at the U. S. Department of Agriculture's Western Regional Research Laboratory in Albany, Calif. Scientists there have been cooking with feathers for a long time and they've finally come up with a batch of products that are opening up a new industry in the United States.

If this sounds overly optimistic, consider the case of one chemical company in San Francisco. For the past six months its trucks have been rolling almost daily on what you might call the nation's first

Feathers fly when chickens are deplumed on this rotating drum at the Department of Agriculture lab.

First, waste feathers are dumped into kettle for cooking by Charles Binkley, left, and assistant.



Keratin or feather protein, below, is precipitated with ice water and then the stuff is filtered again.

Then cooked feather solution is filtered through gauze to remove any undissolved bits remaining.

Resultant oatmeal-like material, below, is then placed under a hydraulic press to dry thoroughly.

Soapy solution in beakers, above, is a new fire extinguisher which is made from chicken feathers.

Potential big moneymakers are the brushes, right, which are made from the chicken-feather fibers, left.

Oil fire, above, is put out in matter of seconds, below, by the new chicken-feather fire extinguisher.

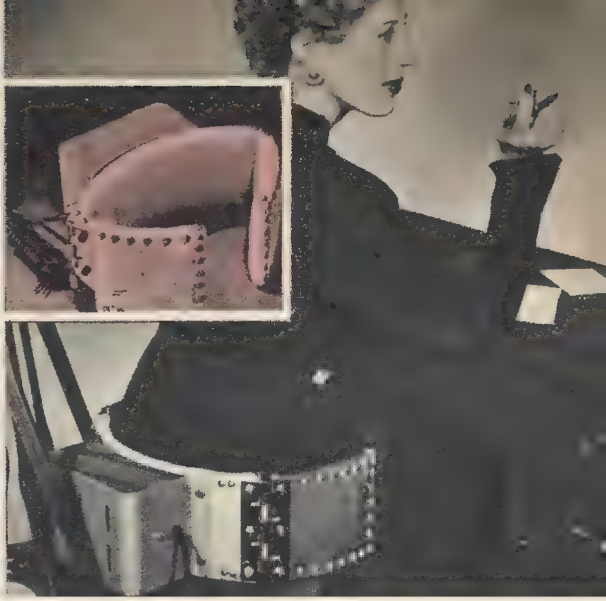
commercial chicken-feather run. They head straight for local poultry-dressing houses, gather up tons of waste feathers which are usually there for the taking and haul them back to the plant where they're cooked by a special process in the firm's four steam kettles. The result? An equal amount of fine powdered fertilizer with a price tag on it that is rapidly boosting the company's bank account.

That's pretty encouraging to anyone who'd like to pluck extra cash from a chick's back but it's especially exciting news to farmers and poultry processors who each year have to figure what to do with 100,000 tons of apparently useless pluckings.

The big trouble is you can't pile these feathers just anywhere or they'd blow all over town. And you can't store them because they soon rot, giving off a stench worse than that of a sewage dump.

Back in 1941, Western Lab researchers faced this agricultural headache and promptly took the chicken feather under their wing, so to speak. Hundreds of pounds of plumage were hauled into the laboratory and there during the years they were minced, boiled, salted, stretched, probed under high-powered lenses and generally given a scientific third degree. Today, this painstaking research is beginning to pay off.

The latest advance in the feather frontier occurred last year as the result of an accidental discovery. Chemist Charles H. Binkley, who had [*Continued on page* 161]



Uke Player is an Arthur Godfrey endorsed Bakelite plastic attachment that fits over any standard ukelele and makes a professional out of you even though you've never had a music lesson. Each of its six buttons plays a complete chord. Emenee Ind., 200 Fifth Ave., New York 10, N. Y.

Gyro-Slim is a reducing unit designed to help your secretary lose weight while she works. All she does is snap the three plastic panels around her, wherever she needs it most, and a motor massages off the pounds. Made by Gyro-Lator Co., 1057 W. Grand Ave., Chicago, Ill.

NEW in SCIENCE

Auto Emblems have proved fascinating for Herbert Cook, of Eagle Rock, Calif. Here are some of the 462 he has gathered during the past 15 years. He restores their finish before mounting them. Highlights in his display are signs from a 1912 Reo, an Ajax Six and an Elcar.

Safe-Nee Pads are life savers for those who work in a kneeling position. A thermoplastic-backed cloth is permanently fused to your work pants with a hot iron. Then sponge-rubber pads can be snapped in place for quick and easy comfort. Safe-Nee, DeKalb Ave., Brooklyn.

LILLIPUT CHOO-CHOO

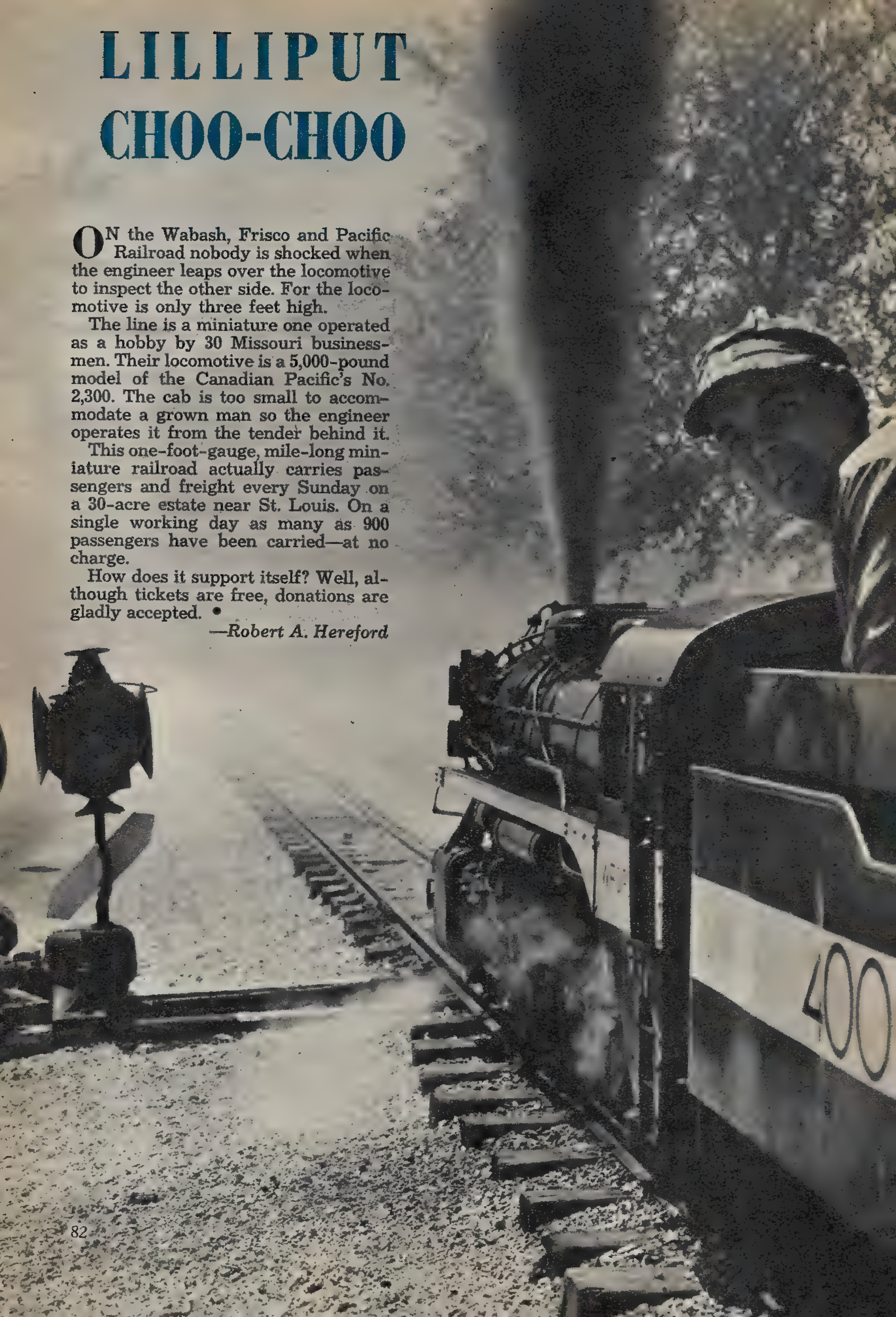
ON the Wabash, Frisco and Pacific Railroad nobody is shocked when the engineer leaps over the locomotive to inspect the other side. For the locomotive is only three feet high.

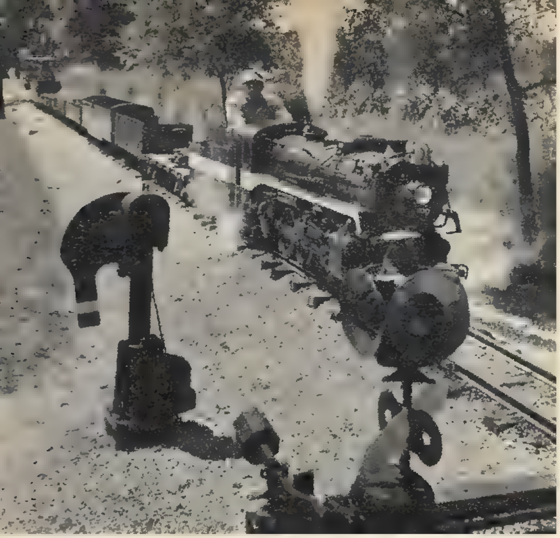
The line is a miniature one operated as a hobby by 30 Missouri businessmen. Their locomotive is a 5,000-pound model of the Canadian Pacific's No. 2,300. The cab is too small to accommodate a grown man so the engineer operates it from the tender behind it.

This one-foot-gauge, mile-long miniature railroad actually carries passengers and freight every Sunday on a 30-acre estate near St. Louis. On a single working day as many as 900 passengers have been carried—at no charge.

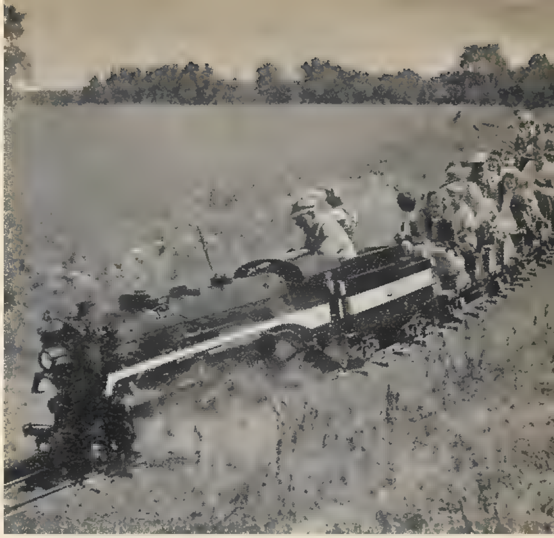
How does it support itself? Well, although tickets are free, donations are gladly accepted. •

—*Robert A. Hereford*

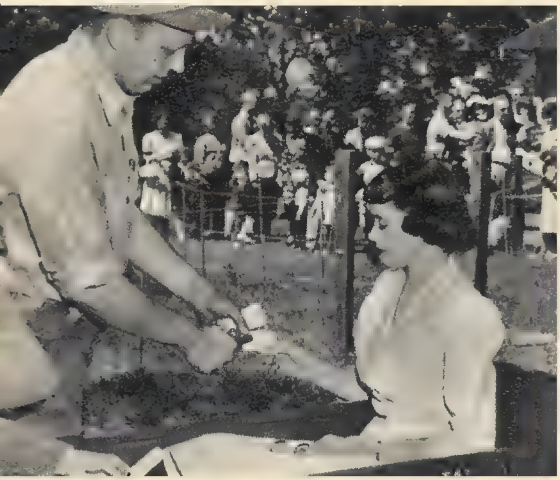




Engineer Joe Hess gets up steam in Engine No. 400, a three-foot-high, 5,000-pound model of the Canadian Pacific's big No. 2,300 locomotive.



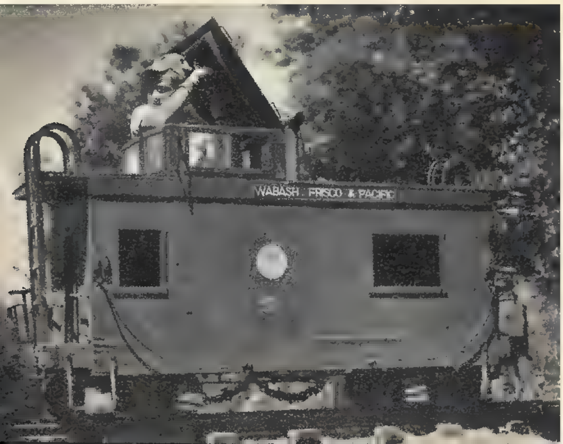
Happy load of passengers, pulled by old faithful locomotive No. 400, is midway through the trip over the little railroad's mile-long right of way.



Conductor punches regulation-size ticket of a passenger seated in the line's small coach. Tickets are free but donations are always accepted.

Dispatcher Louis Schneider writes out clearance slip in the dispatcher's office before the train is pronounced ready for its scheduled departure.

Even the caboose looks like the real thing. Here a young trainman-hobbyist checks over the scene in the Wabash, Frisco and Pacific railroad yard.



Railroad shops are also part of the lilliput system. Here workman Charlton Rogers inspects whistle of engine No. 171 which is now undergoing repairs.

COVER STORY

MECHANIX ILLUSTRATED
15¢
What is This New Secret Weapon?
—See Page 84

America's only jet trainer, the T-33, gives student pilots the feel of handling a 600-mph aircraft.

Everybody gets a big kick out of the Big Yak. On the opposite page is a rightside-up shot of our upside-down cover picture of the jet plane, left.

Jet Fighter With a Face

An assembler on Lockheed's T-33 production line bent over to pick up a speed wrench and suddenly burst out laughing. When he wiped his eyes and got his breath, he pointed to the nose of the first ship in the line.

"Look at that plane upside down," he gasped. "It's America's answer to Russia's Yak—the Big Yak!"

From that day on, the assemblers affectionately referred to the T-33 as the Big Yak, a nickname that has a meaning beyond reference to its funny nose.

For the Big Yak is America's only twin-seat jet training plane, the model in which fighter pilots of the United States Air Force are learning combat flying and the care and handling of jet planes.

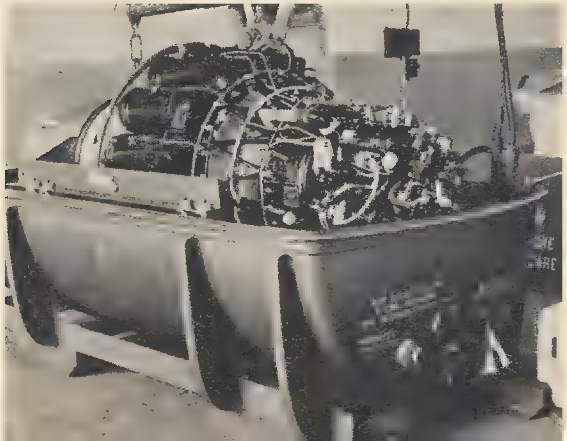
Power plant of the T-33 is the same Allison Model 400 that powers the F-80C combat plane. The 4600-pound thrust engine has an electronic starting device.

Its dimensions are approximately those of the prototype, the F-80 Shooting Star. Both have the same 38-foot, 19½-inch wing span but the new fuselage measures 37 feet 8⅗ inches instead of 34 feet ½ inch.

Only unrestricted performance data available now is the maximum speed (580 mph), stalling speed (117 mph), rate of climb (5525 ft. per min.), service ceiling (40,000 ft.) and range (1345 miles).

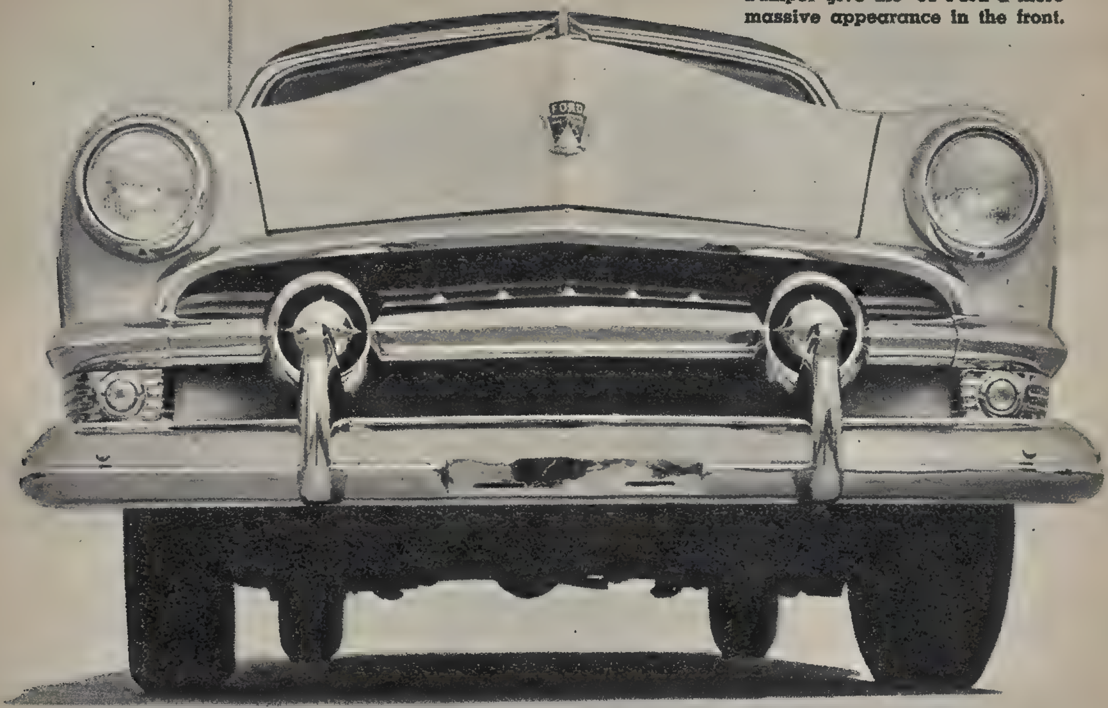
This ship with the grinning upside-down face is today turning out jet fighter pilots to insure American air supremacy. Yes, the Big Yak is really having the last laugh. •

Jet engines come in cans. Here's one with its lid off ready for removal and installation in a T-33.



At the Lockheed plant in Burbank, Cal., the T-33 production line is parallel to the F-94 assembly line.

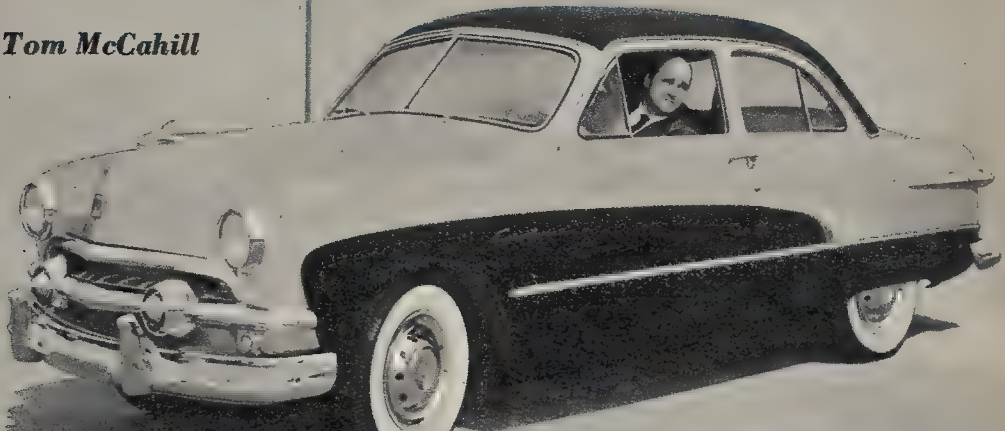
Dual-spinner grille and a wider bumper give the '51 Ford a more massive appearance in the front.



MI TESTS THE '51 FORD

The new Fords are much better built than previous models—and the new optional Fordomatic is actually optional, our auto expert finds.

By Tom McCahill



Uncle Tom sights off the port beam of a hardtop convertible Crestliner. Body style was introduced last year.

McCahill gives the Crestliner a speed run around the Ford test track. He used a V-8 sedan for his performance runs.

A guy named Henry Ford sure started a dilly of a rat race about 50 years ago when he decided to cast his lot in the horseless carriage field. This character wasn't satisfied with just building a few cars and pocketing a reasonable profit. He wanted to put the whole world not only on wheels but on Ford wheels—and he almost succeeded.

Today the name Ford is as American as Fourth of July and, in many corners of this carbon monoxide-weary world, people who never heard of Georgie Washington or Abe Lincoln know all about Henry Ford and V-8. Through the years the Ford empire has shot up like a sunflower in the backyard of a fish factory.

The '51 Fords have changed little in overall appearance since 1949 when they stopped looking like the kid brother of a two-story bus. For '51 the tail lights were reworked and an extra ball has been added to the front grille. Ford now has an automatic transmission and a hard top unconvertible, dubbed the Crestliner. When I first viewed this Crestliner it was painted worm green and crow black with banana yellow trim. I thought this must be some kind of a Halloween gag the boys had worked up but later I found out they weren't kidding (end of comment, on advice of an underpaid attorney).

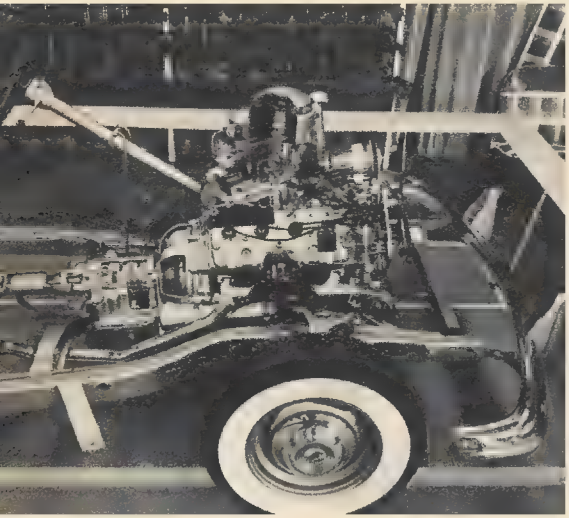
The '51 Ford story is best told by an incident which took place on the Detroiter when I was heading for Detroit, of all places. I was sitting in the club car sipping a lemonade (look, fellows, that's what I have to tell the boss) and one of my fellow passengers happened to be a big-time Chrysler and Plymouth dealer in the East. Naturally, the conversation got around to cars and eventually to his own personal problems with Plymouth competition. The following is almost a word-for-word quote.

"Ford, not Chevvy, is our biggest source of concern," he said. "Ford for the first time in its history is building a quality automobile all the way through—and it's tough competition. The '49 bodies and chassis were rattle-wrapped and so were some of the early '50's but recently they've been really put together."

On my return trip, also on the Detroiter, I found myself talking with one of the top Chevrolet factory men. The same topics were discussed that automobile men always yak about and he said, "Ford's making a damn fine car now, much better than ever before." He added, "Plymouth doesn't worry us in the least but Ford is giving us plenty to think about." Both these conversations took place within 48 hours of each other and amount to a fairly accurate summation of the lowdown on the Big Three.

The Fordomatic transmission is the big

Key starting, a full-circle horn ring on steering wheel, and no clutch (optional) are among changes '51 Ford drivers will notice from the front seat.



Cutaway models, above and below, show Fordomatic. This automatic transmission combines an hydraulic torque converter, planetary gear train.

'51 Ford news, as it was with Mercury. For some silly reason which I won't attempt to explain, because I don't know, the Fords I tested seemed to handle this automatic rig better and to lose less in performance than the Mercury similarly equipped. Undoubtedly the difference in the weight factor had something to do with it. I won't bore you with the harrowing details about how it works, as this is not the kind of thing you'd whittle out in your workshop and, anyway, we've already discussed it in the Mercury piece (December 1950 MI).

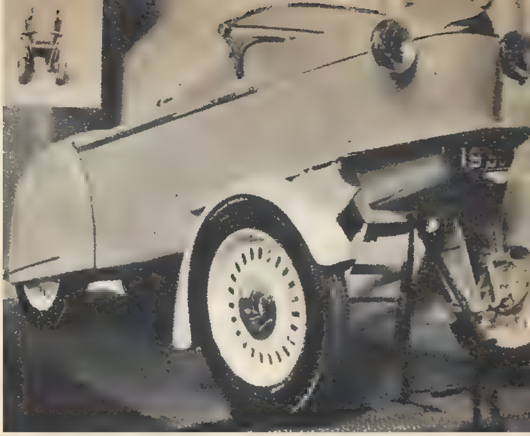
Fordomatic does, however, knock the flash performance and rob the gas tank. Extra cooling precautions were added to accommodate the additional load created by all such transmissions. Fan pitch was increased and so was the radiator core. A fractional increase can be made in performance by starting in Low and shifting to Drive range at about 35. Zero to 60 using Low and shifting averaged, on many runs, 16 seconds flat. Zero to 60 using Drive all the way took 16.6.

This automatic equipment is optional now and you can still buy Fords with overdrive and standard transmissions, which gives them a wider range of appeal than their competitors. Overdrive is still the best buy in my book.

The Ford V-8 engines are practically the same as those introduced nearly 19 years ago. Through the years they have undergone refinements and are no longer the oil hogs they were before the war, but they are basically the same engine that went into the Ford chassis when Hoover was emptying out his desk at the White House.

Since 1932 the Ford V-8 engine has become one of the most famous power plants in the world. It has been tough enough and good enough to stand all sorts of hot rod alterations and has placed in the money at Indianapolis against the world's best custom-built jobs. I personally bought Fords for years just on the basis of this terrific engine and nothing else. However, it's now getting just a bit dated and a big change is due before 1952, barring war. There are already more efficient, really new engines, in some of the higher priced American cars. Until these were introduced, Ford didn't have to take a back seat to any power plant.

In recent months, Fords have been taking an awful drubbing from Plymouths in stock car racing, as has nearly every other car. In the big time stock car races, such as promoted by Bill France and the Nascar organization, Plymouth has been battling it out with the Olds 88 for top honors in races of 100 miles [*Continued on page* 162]



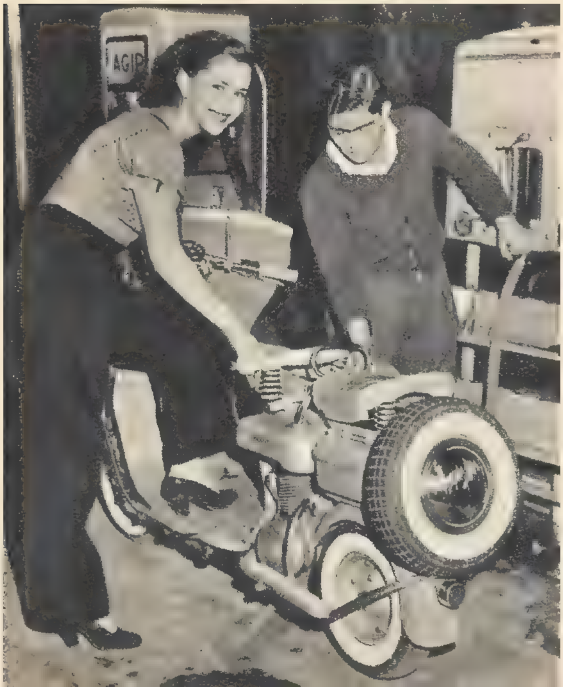
Bump-Proof Tractor went on display recently at the Earl's Court Commercial Motor Show in London. It has drive for all six wheels and can negotiate the roughest terrain. In tests it has been driven through water six feet deep. Front fenders rise and fall with the wheels.

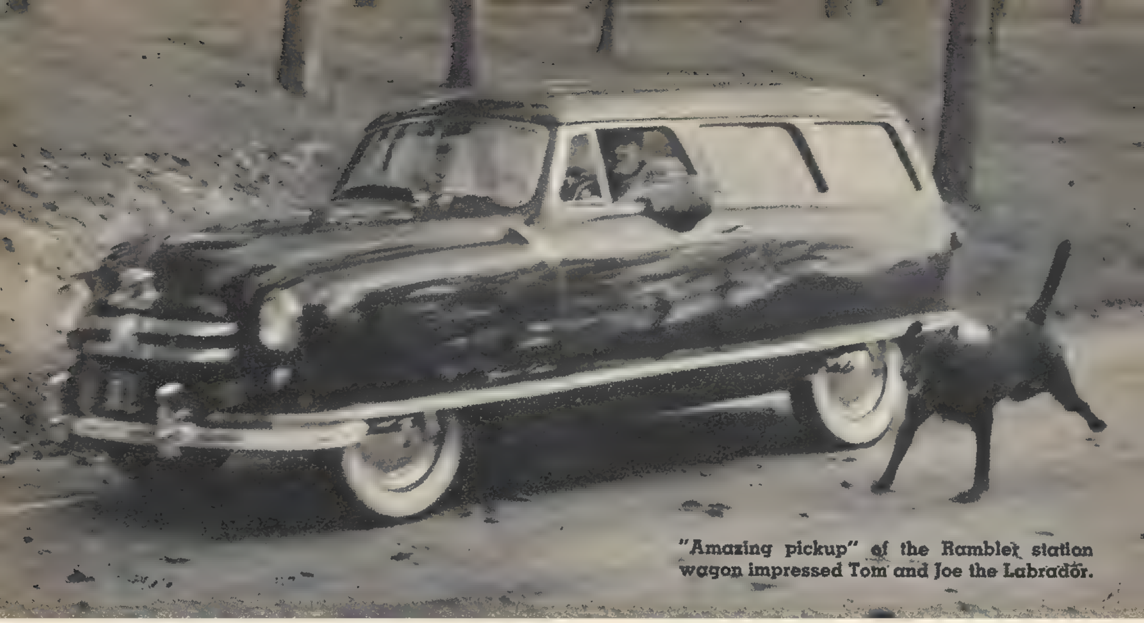
Go-Anywhere Car was displayed at the 37th International Automobile Exposition in Paris. It is four-place with folding top and windshield, but its main claim to fame is the unusual wheel suspension. When front is lifted, wheels fold decreasing width for parking or garaging.

NEW for the ROAD

Scooter Service is being supplied by many filling stations in Rome, Italy. Because of the skyrocketing popularity of the tiny vehicles, special pumps have been installed to meter out the correct mixture of gas and oil automatically. A quart costs about 21 cents, is good for 30 miles.

Automatic Breaking is offered car owners by a new gadget which eliminates the brake pedal. Called Accela-Brake, it attaches to the accelerator. Pressure by the driver's toe works the gas; pressure by the heel works the brake. The clutch? We got rid of that old thing long ago.





"Amazing pickup" of the Rambler station wagon impressed Tom and Joe the Labrador.

McCahill Drives the New Nashes

"Good automobiles—and the boys who build them know what they're doing," MI's expert reports.

By Tom McCahill

THE late W. C. Fields, at the height of his juggling career, would have gone into a tailspin at the thought of keeping as many projects in the air as Nash has been doing for over a year. At this writing Nash, a small outfit when compared to any of the Big Three, is pumping out three entirely different models: the little Rambler convertible (May 1950 MI) and station wagon (covered in this issue) and the big Ambassador and Statesman, also subject to scrutiny in this piece. And other models are reported to be on the way.

A Nash-Healey, similar to the car that finished fourth in the 24-hour Le Mans race in France last summer, is scheduled to be in Nash showrooms before the bull frogs burp "scram" to ducks migrating North. The Nash-Healey is an English Healey two-seater sports car with a Nash Ambassador engine and Nash overdrive transmission. It will be the first real competitive job sponsored by a major American manufacturer since the advent of talking movies.

1 Front grille of the '51 Nash has the same outline as last year's but is convex instead of concave, thus affording improved cooling.

2 Uncle Tom gives a '51 Ambassador the garden hose test to show the effectiveness of waterproofing of the ignition system this year.

3 Streamlined tail fins are higher on the 1951 Nashes and give the new cars' rear fenders a more elongated and graceful appearance.

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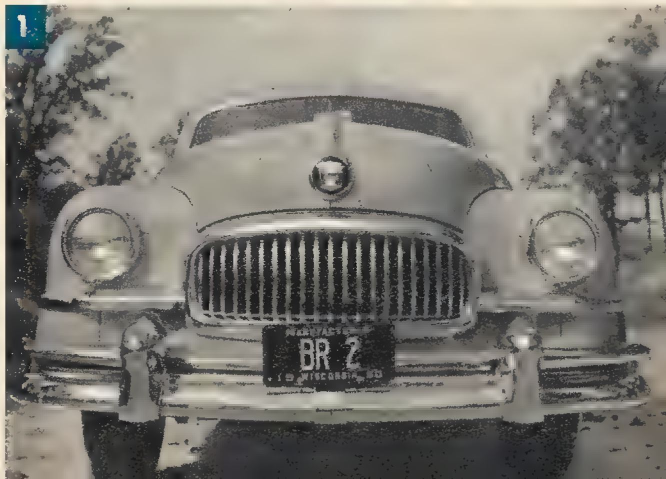


Although the Rambler station wagon's baggage-carrying capacity is fairly restricted by big car standards, Tom noted that there is even more leg room up front than there is in Nash's bigger cars.

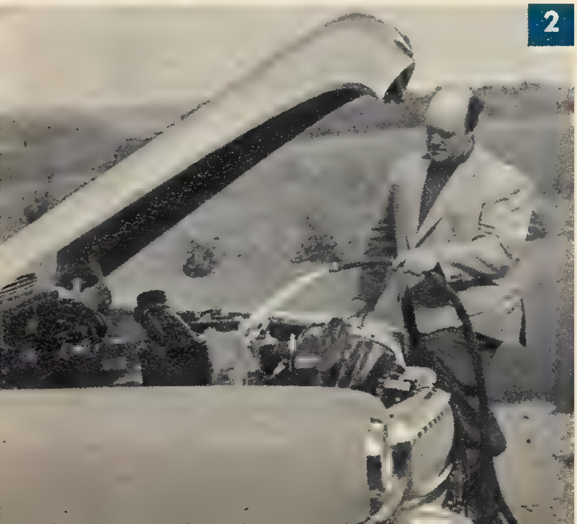
The famous Nash X car which was indeed an international razmataz, being part-English, part-American but mostly Italian and looking like a sport Fiat, is still simmering on the back burner. This was the small sample roadster Nash showed a little over a year ago from coast to coast in a said-to-be effort to test public reaction. If nothing else it was one of the smartest publicity gimmicks in recent years and the boys who are supposed to be in the know have never been quite sure whether Nash was kidding with this so-called thousand dollar beauty or not.

As if that wasn't enough to keep the Nash organization as busy as a mouse in a barrel of hungry cats, they also hired a little guy named Pinin Farina to be their stylist for future models. Farina designed many of those sexy Alfa Romeo's you sport fans have seen and shmooed over and if the boys at Nash allow him a free hand you are in for some of this out-of-the-world continental stuff with a "made in America" label. On my recent trip to the Nash plant in Wisconsin I gathered that some of the personnel were not too happy about Farina joining the Nash team—a little odd in my book because Farina can give aces and spades to any automotive stylist in America today and still make him look like one of the soap box kids.

If you have both eyes open up to here you must realize that Nash has a three-ring circus going with all stops open on the calliope. It is America's number one automobile company, hands down, so far as grabbing the ball and trying for a touchdown is concerned. Nash, a little company, is pitching forward passes, making end runs and crashing center all at the same time in an effort to draw blood from the almost impregnable Big Three. They are not satisfied with the leavings as some other independents are. They are out to win and if they do it will be the same as Waukeegan High tumbling the great Army team. If nothing else, you have to give Nash all-American honors for effort and daring and for trying to gain ground where others have sat down.

Recently a new automotive writer made a statement to the effect that Nash cars were not fast and that Nash was not interested in speed. Well, for a company that's not interested in speed or racing,

2



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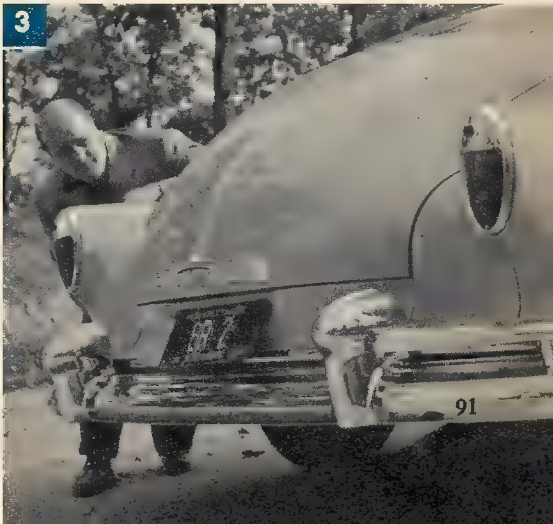


For the first time, Hydra-Matic is available in the mid-priced Statesman line, whose four-door sedan Tom inspects.

Nash has a rather strange way of showing it. Nash has been more active in stock car racing than any other American car I know about. The famous Nash-Healey didn't catch the company's eye because it was a nice car for the baby sitter to drive junior around the park in.

In the famous Mexican 2100-mile road race, Nash was far more than an interested bystander. Though officially they may deny this, they have been pointing out in national ads ever since that a Nash Ambassador did 712 miles at an average speed of 95.328 miles an hour and that a Nash Ambassador was the third car to finish out of a field of 52 finishers, which included just about every American make of car plus three imported ones. A number of readers have written to ask what's the dope on that Nash Ambassador doing 95 for over 700 miles and on fairly hazardous roads.

When I questioned a top Nash engineer about this, suggesting it would take a hell of a hot Nash Ambassador to go better than 95 for one mile much less 700, he laughed and answered, "Yes, I know, but look at the record." Well, I looked at it and the only way I can buy it is to point out that in Mexico they measure distance in kilometers, just under five-eighths of a mile. Of course, there may be something in several rumors that have leaked out of Mexico since the race, saying that when cars were checked at the finish some were found not to be exactly stock. Compressions on several of these cars, the story runs, went as high as 10 to 1 and there were a few other alterations not exactly according to Hoyle.

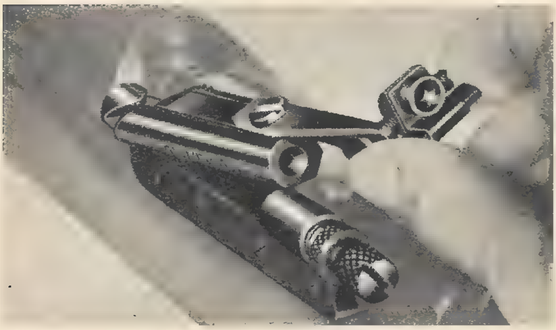
I am not suggesting that the Nash referred to wasn't absolutely stock but I know Mexican roads very thoroughly by personal driving experience and I *am* suggesting that miles and kilometers may have been used synonymously in the race reports. In Mexican miles, 95 mph would have meant an average of about 60 mph the way we figure. This sounds more like it to me. Even 60 would be a high average and indicate fine driving over those Mexican roads. However, I wasn't there and a miracle *may* have taken place.

Now back to the three new Nash models I tested. When I originally tested the Nash Rambler on Daytona Beach, many factors were against a too accurate performance report. This was the first convertible built and was not in apple pie shape when I drove it. As those who read the article may remember, I grabbed this first test car from the advance promotion photo team in Florida and made [*Continued on page* 166]

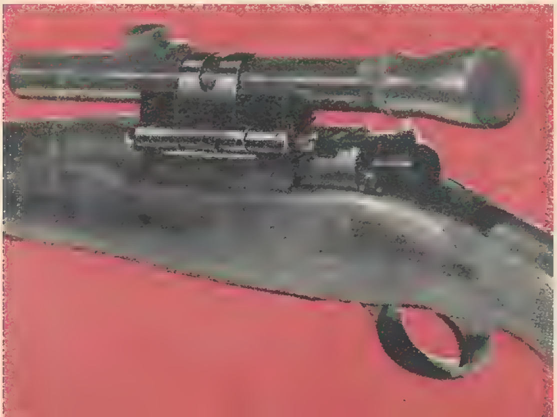
NEW for the SPORTSMAN

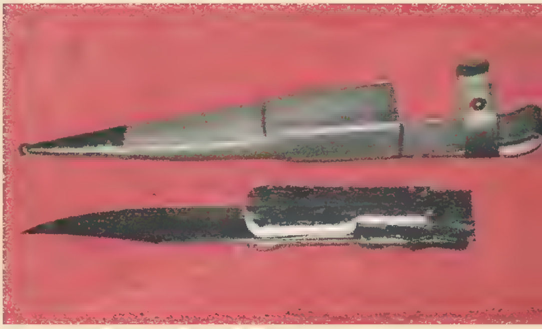
Storm Suit of Vinylite plastic folds to pocket size and is much tougher than previous models. Pants have suspenders and adjustable waist. Jacket has detachable hood and inside pockets for cigarettes or tackle. Seal-Dri, Rockford, Ill., makes it.

Trigger Lock for revolvers makes accidental discharge impossible. It is made of cast aluminum alloy with an internal groove which fits trigger, holding it immovable until released by the turn of key. Bjorklund Mfg. Co., Venice, Calif.

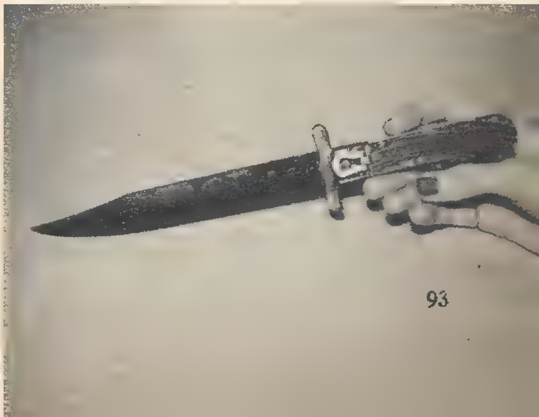


Quick-Change Mount by Mykrom of Portland, Oregon, permits instant interchange of scope and receiver sight on rifles. It weighs less than six ounces. The pocket-size iron sight has micromatic windage, elevation adjustments.



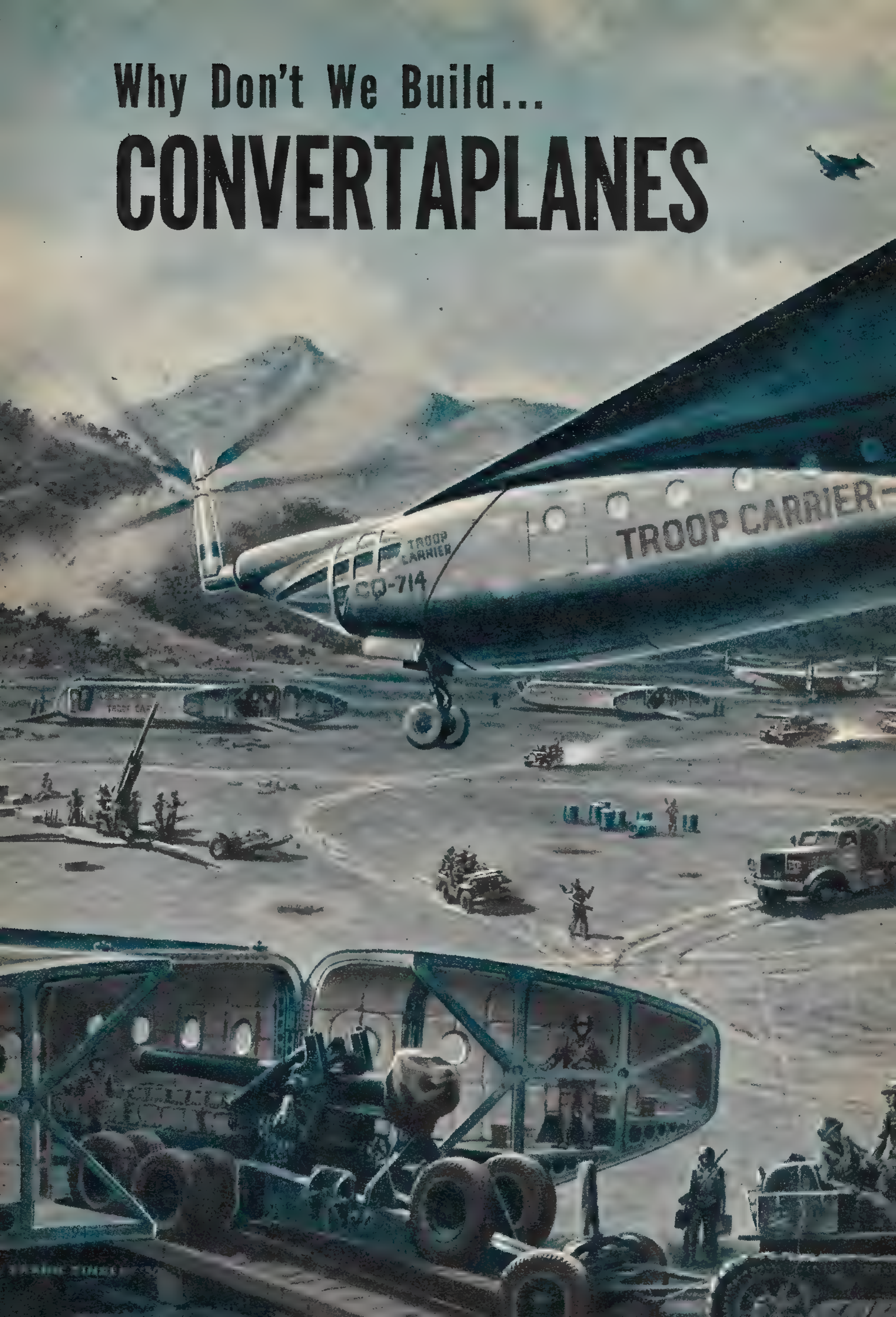


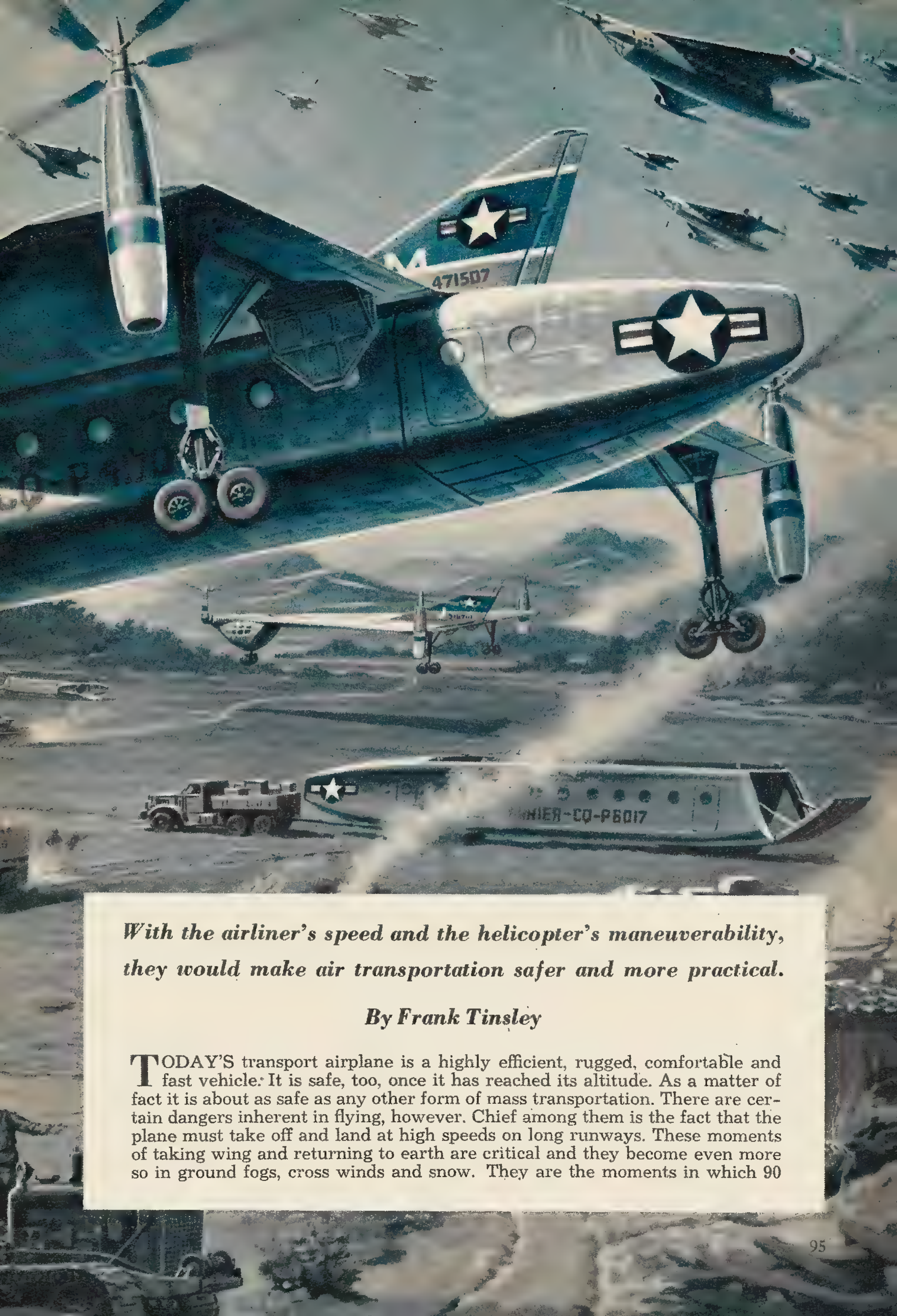
2-In-1 Knife for hunting can be used either as a short blade or a long blade. When closed, above, 4¼ inches are exposed, 7⅜ inches when open, below. Press release near finger guard locks the blade in either position. Hoffritz Cutlery, N. Y.



Why Don't We Build...

CONVERTAPLANES

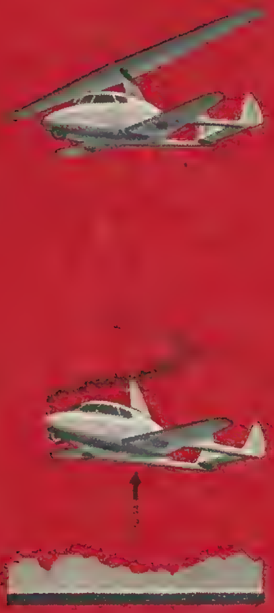

TROOP CARRIER
CQ-714
TROOP CARRIER



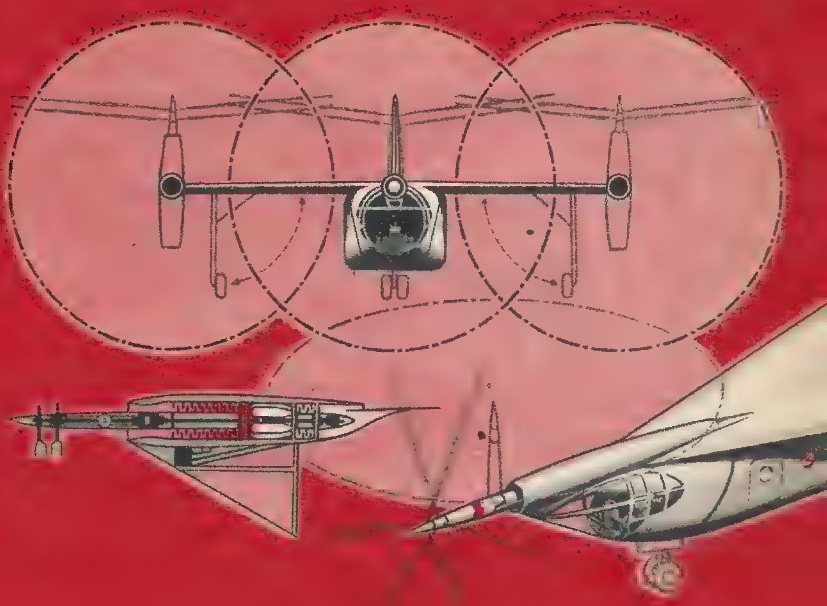
With the airliner's speed and the helicopter's maneuverability, they would make air transportation safer and more practical.

By Frank Tinsley

TODAY'S transport airplane is a highly efficient, rugged, comfortable and fast vehicle. It is safe, too, once it has reached its altitude. As a matter of fact it is about as safe as any other form of mass transportation. There are certain dangers inherent in flying, however. Chief among them is the fact that the plane must take off and land at high speeds on long runways. These moments of taking wing and returning to earth are critical and they become even more so in ground fogs, cross winds and snow. They are the moments in which 90



Earliest was Herrick's, above, in which biplane's upper wing was unlocked and made to rotate as in a helicopter.



Convertaplane described here would have three power units which could be swiveled upward to act as helicopter rotors. Engines would be interconnected by shafts so if one should fail, others could take over.

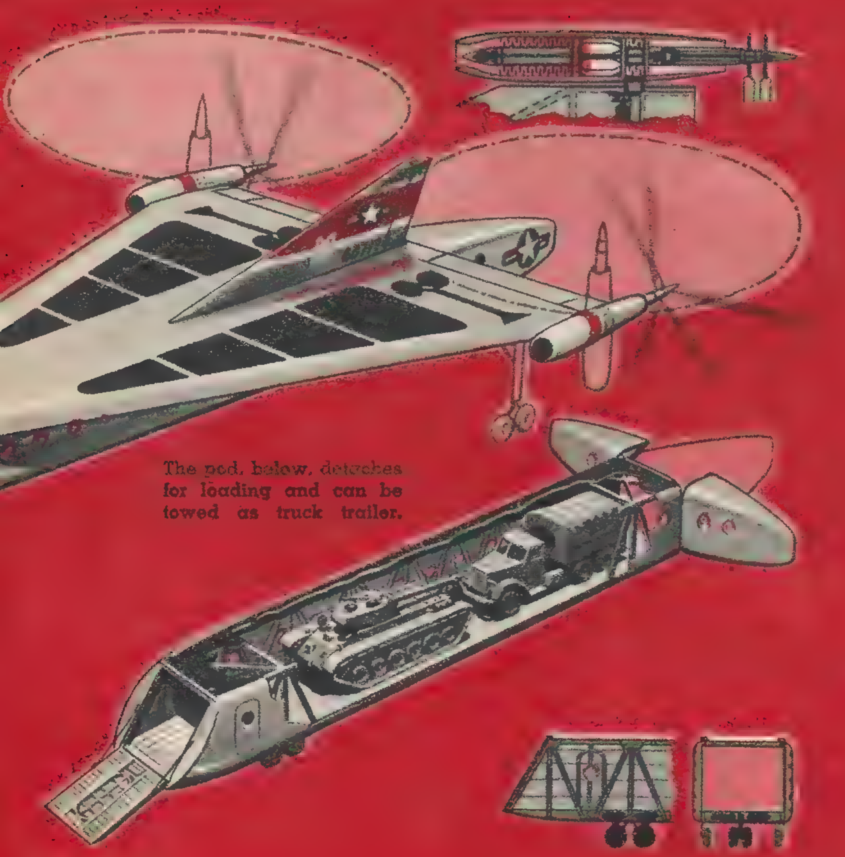
per cent of all air accidents occur. Then, too, long runways are expensive. They take one of the biggest single bites out of your air-travel dollar. And the land area required for this criss-cross complex of concrete pushes the airport so far out of community centers that time gained in flight is lost in field-to-town travel. In short, today's airplane may be fast and comfortable but it is expensive in ground time and space, and not nearly as safe as we would like to have it.

The helicopter, on the other hand, solves all of these problems. It is the only aircraft that carries its own, build-in parachute and it lands at practically zero ground speed on the proverbial dime. It can buzz right in over a field at cruising speed and altitude, hover as long as necessary, then descend vertically. It touches down on terra firm under full flight control as slowly and lightly as a feather and in little more space than the diameter of its own rotor. There are only two faults with the present day helicopter. Its range is short and compared to the airplane, it is slow as molasses.

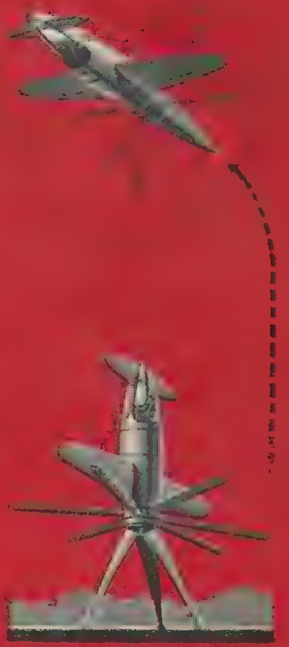
Why, then, can't we have a fast-flying, slow-landing transport that can convert in flight from helicopter to airplane and back again? The answer is that such a plane is on its way. Despite the inertia that retards all new concepts and notwithstanding the knotty technical problem involved, the logic of the convertaplane can't be denied.

Back in the thirties Gerald P. Herrick of New York, often called the father of the convertaplane, built and flew successfully full-scale prototypes. They were biplanes whose pylon-mounted upper wings could be unlocked and spun as auto-gyro rotors. His latest model, a low-wing pusher plane, is fitted with an upper rotor-wing driven by small jet engines mounted in its tips.

A later method of conversion is a bit more startling. A missile-like aircraft, equipped with sub wings, rotor propellers and folding, tripod-like landing gear in its tail, takes off from a vertical position. Upon reaching altitude, it rolls over into a hori-



The pod, below, detaches for loading and can be towed as truck trailer.



Third convertaplane design, above, takes off and lands vertically, flops over horizontally for normal flight.

zontal attitude and becomes a wing supported airplane.

A third variation probably will prove to be the most practical method of conversion. In this type, the convertaplane resembles a conventional air transport fitted with huge, slow turning propellers. Conversion is accomplished by rotating the engines and their props in a quarter-circle from the vertical to the horizontal axis of thrust.

In the design shown here the most advanced ideas have been used. Triple gas-turbine power units are arranged in a triangle for balanced suspension. Passengers, cargo, etc., are carried in a separate body or "pod" locked beneath the wing. Fitted with quick release attachments, the pod can be detached speedily from the parent plane to facilitate handling. On the ground, it operates as a trailer bus or truck and contains its own retractable wheel gear.

The pilot's compartment is placed in the convertaplane's nose with full vision forward, up and down. The wing is fitted with "elevon" combination control surfaces. Its triangular plan structure is tremendously strong and rigid, providing ample support for the outboard power units and wide-tread landing gear.

In horizontal flight, the forward power unit functions as a tractor propeller and the rear pair as pushers. The latter are fitted with standard controllable-pitch devices and as they rotate, blade angles are automatically changed from full push to zero and then to full pull whereupon they become tractor rotors lifting upward. While this is taking place, the forward rotor which requires no blade change maintains the convertaplane's speed.

Last September, the Air Force and Army opened a design competition for convertaplanes. Specifications for military models have been distributed. At last, the pioneers of this new form of flying machine can go ahead with the promise of government support. And Uncle Sam will be the first to blossom forth with an air-transport service that is convenient, speedy and safe! •

A Cincinnati professor built this seven-room house which uses "reflective radiant conditioning."

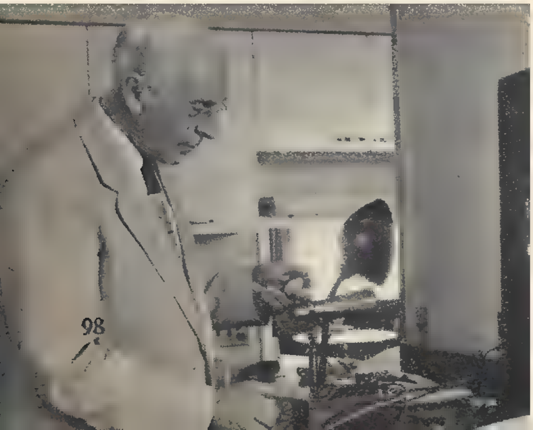
heat yourself—not your house

ATOP a hill overlooking Cincinnati, Ohio stands a house that may revolutionize present day heating methods.

Dr. Clarence A. Mills, its designer and owner, believes that the rate at which body heat is lost is the factor which makes us feel hot or cold, and so he has covered his walls and ceilings with aluminum foil. In winter, heating coils radiate warmth which is reflected from the shiny foil to the body. In summer, body heat is absorbed by cooling units. Says Dr. Mills, "The heat comes as a soft glow, like winter sun in the Alps." •

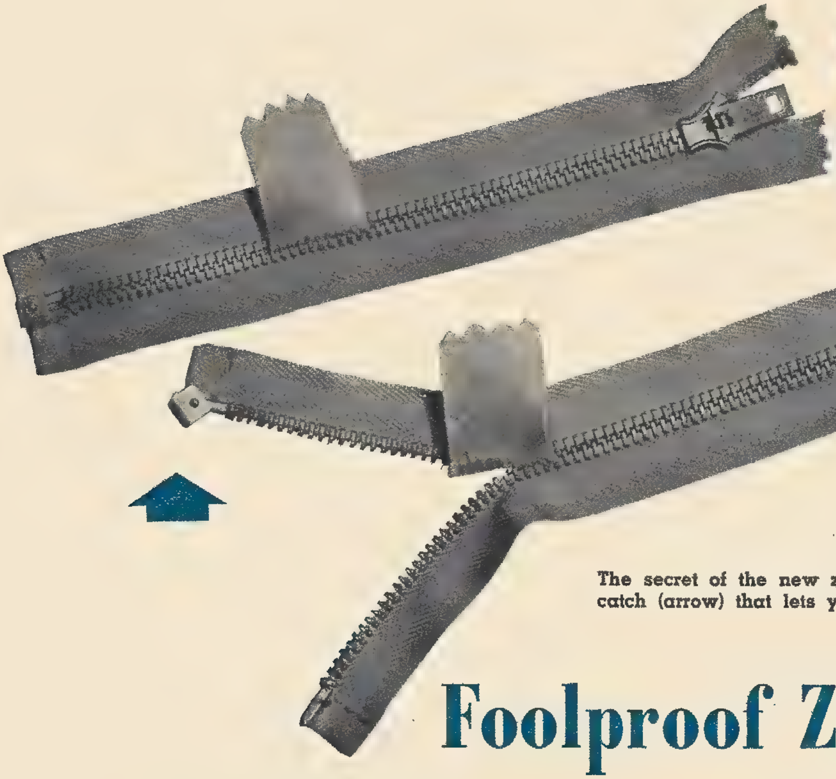
Registers in the basement record heat exchange in every room in the house and control system's temperature to keep the occupants comfortable.

Mills, whose field actually is experimental medicine, uses an instrument to measure the degree of reflection from a sheet of aluminum wallpaper.



Dr. and Mrs. Mills in their living room. Walls are covered with aluminum foil. Trough around the ceiling holds cooling coils and heating units.

THIS MONTH'S
prize gadget



The secret of the new zipper lies in the swivel catch (arrow) that lets you open it from bottom.

Foolproof Zipper

LATE for an extra-special date, Ben R. Austin, freshman at Vanderbilt University, Nashville, Tenn., heaved a sigh of relief when at last he finished dressing. But when he zipped up his raincoat, catastrophe struck. The zipper caught his brand new tie. It wouldn't budge and tie, temper and date were ruined.

Eventually Austin got over his date-less evening but he just couldn't forget the trouble zippers could cause. For years the problem tantalized him. Then one day he tried a fresh approach, came up with a zipper that could be opened at both ends. This solved not only the jamming problem but offered other advantages as well. Obstructions can be freed by ripping the zipper apart from the bottom and then zipping it together again. With the Austin Swivel Zipper mismeshing is easily corrected.

For helping folks out of jams, MI has unzipped its vault and sent Ben Austin $50. •

Ben R. Austin, at work on one of his Swivel Zippers, is confident that his invention will save millions of people embarrassment.

WIN $50

Dreamed up a neat gadget? If you're pretty keen about that pet project of yours, get busy and work it out in your shop. Then send pictures and a description of your invention to the Gadget Editor, Mechanix Illustrated, 67 West 44th Street, New York 18, N. Y. Each month the best entry will be given a cash prize of $50.

coons by

moonlight

You have to be sure-footed and tough to roam the black woods for raccoons. And a bit crazy, too.

By Raymond R. Camp
Rod and Gun Editor, N. Y. Times

REGARDLESS of what some hunters say, you do *not* have to be crazy to hunt coons—but it helps.

One middle-aged sportsman, when his leg was out of the cast, his briar cuts had healed and the danger from barbed-wire infection was past, came up with a definition of a coon hunter, "A former fox hunter with his brains knocked out." This definition has some noticeable flaws, however, for I know any number of men who hunt foxes by day and coons by night and really enjoy the sport. But how they find time to sleep or attend to their regular business activities has always puzzled me.

After your first coon hunt you are either a life-long follower of the sport or you shudder at the very mention of the word "raccoon." The requirements for a hunt are rather simple, provided you happen to be within reasonable distance of some woods inhabited by this wise little animal and you'll find almost any large forest in the farm-fringe area meets this qualification. Now that Junior no longer considers a coonskin coat a vital part of his college wardrobe and the women have abandoned long-haired furs in favor of that "slim look," the raccoon has increased his range and abundance.

First, you must find a man with a couple of coonhounds. Or, a man with a couple of hounds that he *says* are coonhounds. Almost any hound, with a little training, will run coons but a really good coonhound is about as difficult to find as a good grouse

Coon at left fought the dog on the ground for several minutes, then decided to climb.

This hunt ended in the morning in an orchard. Even the dog tried tree climbing.

Big coons aren't common but this one bagged in Russell, Pa., by Clarence Ackeley weighed 48 lbs.

Agility of the coon enables him to battle and kill the moccasin, one of the deadliest of snakes.

dog and will bring as high a sale price.

Having gotten your dogs, next you need a three-cell flashlight with fresh batteries, loose warm clothing that you do not mind having ripped to pieces, fair night vision, good hearing and, last but not least, the *desire* to go coon hunting. Thorough familiarity with the country you are going to hunt is a real asset, too. You may have hunted a forest for years by daylight, but after entering just the fringe of it at night, you will find you are completely lost. This condition, of course, is one of the interesting features of the sport.

My last coon hunt several years ago was something I won't forget in a hurry. Each fall I made it a ritual to spend a few days hunting grouse with an amiable old reprobate whom, to eliminate any threat of libel, we shall call Frank. Frank always had at least one better-than-fair grouse dog, a couple of beagles, an odd foxhound or two and a collection of coonhounds. Despite the fact that he occasionally overlooked the game laws, especially during the late winter when meat was scarce and venison was plentiful, Frank was a sportsman. Also, he was one of the finest woodsmen I have ever encountered.

That year a friend, Marshal, accompanied me on the junket and on the third day two other hunter guests appeared at Frank's board. They had been directed there by a New York crony of his and were full of enthusiasm at the hunting prospects. Both were attired in costumes that were perfect illustrations of what the well-dressed sportsman will wear. Their guns, long elaborate hunting knives and costumes were fresh from New York's most exclusive sports shop. However, both claimed to be veteran hunters. Frank nodded, but doubt was apparent in his eye.

Dinner over, Frank spoke through the smoke of an odorous corncob.

"I been wantin' to give my coonhounds a good run and the season opened today. I seen some coon sign over to Crossways Brook last week. Let's go over there tonight an' give the ringtails some action."

We agreed that it seemed an excellent idea and the new arrivals chimed in that they liked nothing better than a good coon hunt. Frank raised his eyebrows in simulated surprise just as though he had not planned the entire procedure that way.

"Guess you can go along," he admitted. "You got flashlights? Outside it's black as the inside of a cow."

The two sportsmen protested that they were accustomed to traveling the woods by night and needed no artificial aids to vision. So 9 p. m. found the five of us happily climbing out of Frank's ancient sedan whose interior had been made very uncomfortable by the presence of his three large, active coonhounds.

"Remember where this car is," Frank cautioned. "We might get separated an' I'm not plannin' on scourin' the woods for any lost hunters."

The dogs had been put down only a few minutes when one let out a deep-toned bellow and the other two very quickly joined him. Frank took off through the swampy undergrowth with Marshal and me at his heels. Without our flashlights we would have mired down in 50 feet. Behind us we heard a floundering splash and a cry. One sport in a pothole! A few seconds later there was a crashing in the alders, another splash and a shout. We continued in pursuit of Frank and his hounds.

The coon was an oldtimer and smart. Three times he treed and while the dogs were barking he would run through the branches like a squirrel, move over to a tree four or five removed, then continue on the ground. Finally he crossed the fields of an isolated farm and climbed a towering walnut tree. The farmer's ancestor had planted that tree for shade and it was located between the house and a small greenhouse. As we approached, the farmer's voice rose even above the yelping hounds. He did not greet us as brothers.

"Take your blasted hounds an' get out of here," he roared. "I got to get my sleep, an' I can't with all this racket."

Frank, believing he knew this farmer, roared out his identity and suggested, profanely, that the man shut up and go back to bed.

At first it seemed the other was accepting the suggestion for his head disappeared from the upstairs window.

"You shinny up the tree an' shake down the coon," Frank told Marshal. "He's up there only a little ways an' you've got longer legs an' arms than we have."

Marshal was about to begin his climb when he was arrested by a cry from the farmer whose head reappeared at the window. His arms also were visible and in them he held a double-barreled shotgun.

"I'm goin' to count ten slow," the farmer roared, "which will give you time to grab those hounds and get out of range of this gun. I'm going to get my sleep even if I have to go to jail for murder. Get movin' an' quick."

He began counting slowly and loudly.

"Go on up an' shake out that coon," Frank advised. "The ol' coot wouldn't dare shoot."

Marshal, against his better judgment but partially shielded by the heavy tree trunk, began his climb. We heard the farmer reach the count of ten and then there was the roaring blast of both barrels of the shotgun.

Marshal and the coon both fell out of the tree, landing on the dogs, and there was a great melee of man, hounds and coon. Frank and I had thrown ourselves flat and although on his belly in the grass, Frank was trying to grab the coon.

But that was not the worst. The farmer had fired well over our heads but had forgotten all about his greenhouse. The shot must have smashed at least two dozen glass panes.

Finally Frank subdued the coon and the three of us pelted down the rutted drive to the nearest road, pursued by the hounds and the farmer's cries. At the end of the lane we saw his R.F.D. mailbox and in it we left some money to repay him for the broken glass.

When we reached the car there was no sign of our two night hunters.

"They're in the woods there somewhere," Frank declared. "We'll build a big fire an' wait till they find their way out."

It was almost 2 a. m. when they appeared, their fancy costumes in tatters, both badly scratched about the arms and face and one limping from a twisted ankle. They had nothing to say on the return trip and they had departed before we turned out for breakfast that morning.

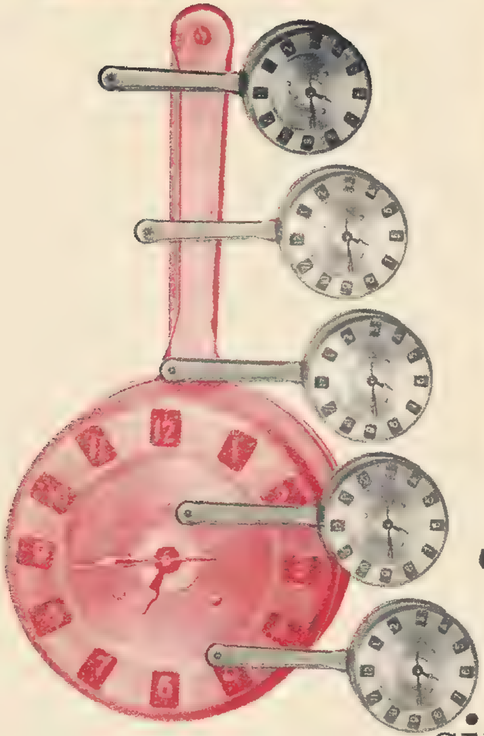
While this was not a typical coon hunt, it was a fair sample. As a sport, it is rugged but interesting. Any man who likes hound music, enjoys the chase and whose bones are not too brittle, will find it an enjoyable pastime.

A word of caution: While crashing through the dark woods on your first coon hunt, watch out for another little animal which resembles a coon but which can put an end to your hunting at least for that night. No one yet has been able to devise a satisfactory process for getting rid of the perfume of skunk! •

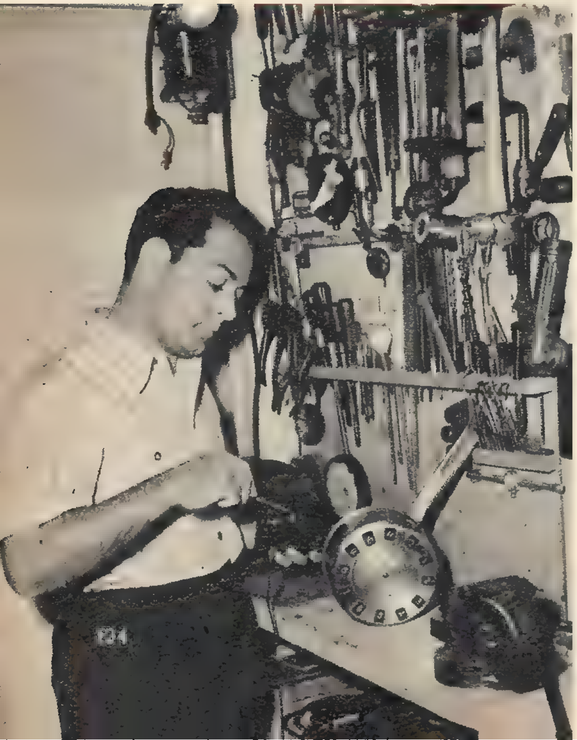
Nine ringtails were a night's fun for Art Thibodeau, Waterville, Me., Police Captain and his hounds.

Raccoons multiply rapidly. They abound in Northern Maine woods, were introduced 20 years ago.

hobby
HALL OF FAME



Felix Knight—singing clocksmith



HOW does a famous American tenor occupy his leisure time? Why, he just turns pots into clocks. He takes a two-quart aluminum or stainless steel saucepan with a long handle, the works from an inexpensive electric clock and 12 numbered disks. Then he sets to work with a template, a drill, a screwdriver and some wires. The result of this hodge-podge is a unique kitchen clock and a lot of satisfaction.

Felix Knight's home workshop nestles in what once was a linen closet in his Manhattan apartment. When he gets tired of whipping up kitchen clocks he releases his energy in building radios, phonographs, tape recorders. When Knight is singing, you'll find him in glamor roles such as the one above, a scene from the operetta The Student Prince. Or else, you'll see him on stage at the Metropolitan Opera House in New York or touring with opera companies. He's in the movies and on the radio, too. But, he says, there's no place like a linen closet to make a fellow feel at home. •

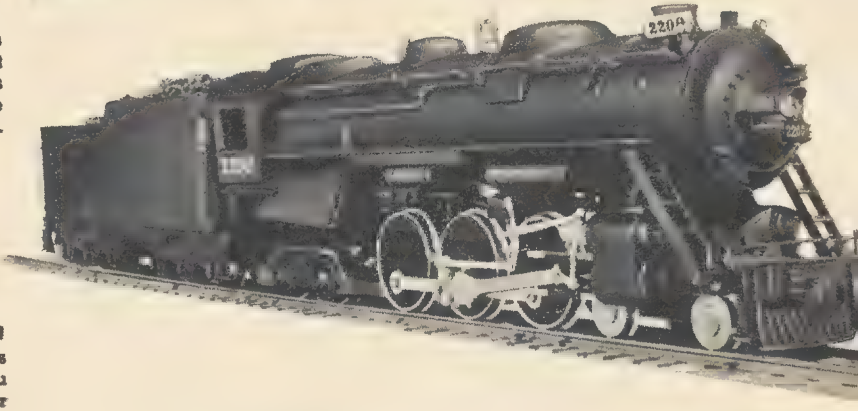
mi Crafts and Hobbies

Wall Holds All . . .

. . . when graced with a unit like this. Despite plenty of storage room, very little floor space is occupied. Construction plans are on the next page.

For Model Makers

With this issue MI begins its Roundhouse section. It will contain news and notes for modelers suffering the chug bug fever. Page 114.

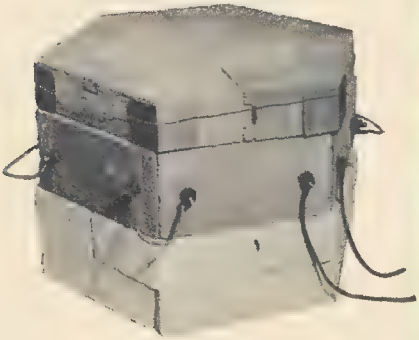


Make Your Own Kiln

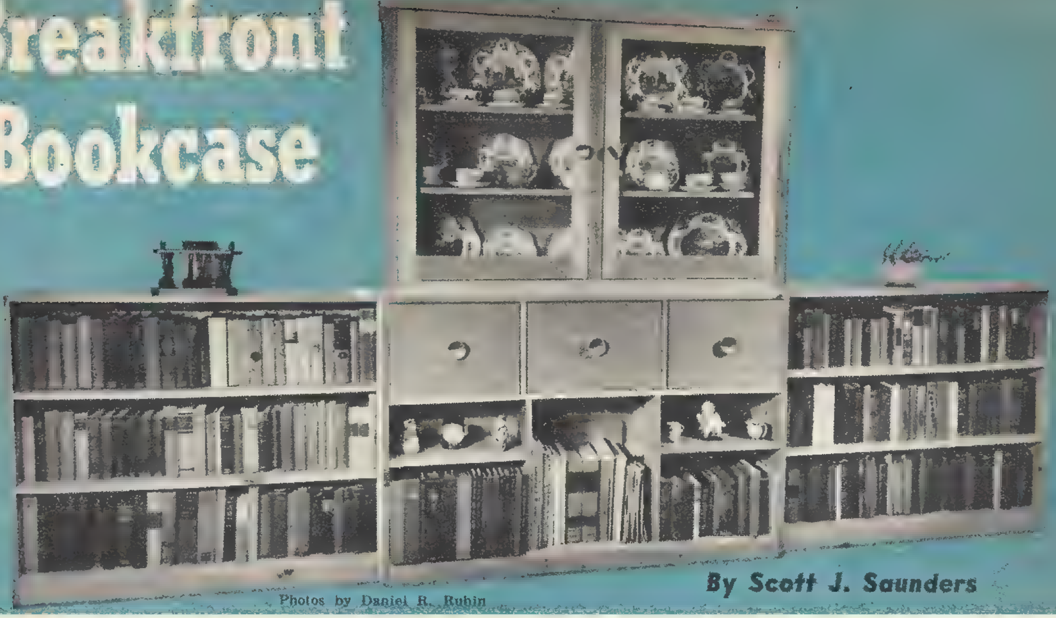
By following instructions beginning on page 110 you will be able to glaze your ceramic creations to a high degree of perfection.

Here It Is!

Our many readers who have been asking for plans of a model MG will find them starting on page 134.



Breakfront Bookcase



By Scott J. Saunders

Photos by Daniel R. Rubin

You can build fine furniture using muscle power and hand tools—and here's a project to prove it.

THIS practical job is for you space-starved householders. Occupying a frontage of 12 ft., this unit provides plenty of room for china, linens, record albums and about 200 books. If you can use only one bookcase, put the cupboard in the corner and place your bookcase next to it.

There are really four parts to this project: the china cabinet, breakfront and the bookcases. After the sections are completed they should be screwed together. Start on the bookcases first. The wood throughout is 1x10-in. knotty pine. The top is 42 in. long, the three shelves 40½ in. long and the sides 36 in. high. Bottom facing is 1x3, 40½ in. long. Lay the top board on the sides and nail down with 2½-in. finishing nails after applying glue to both surfaces. Follow this by nailing and gluing the 1x3 to the bottom.

Add the shelves at 10¼-in. intervals after

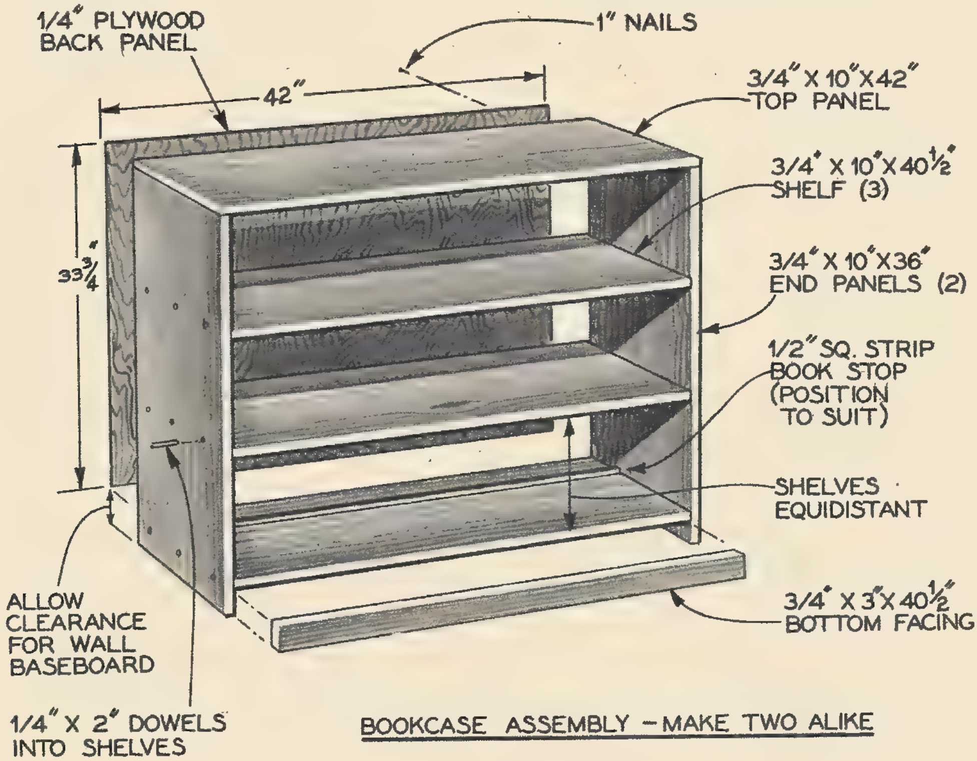
Left: Center door is hinged on bottom and supported by chains. Right: Note how quarter-round molding is attached between units and at china cabinet base.

making sure your frame is square. To reinforce the ends, ¼-in. dowels were used but brads, screws or thin wood strips attached to the sides under each end will do just as well.

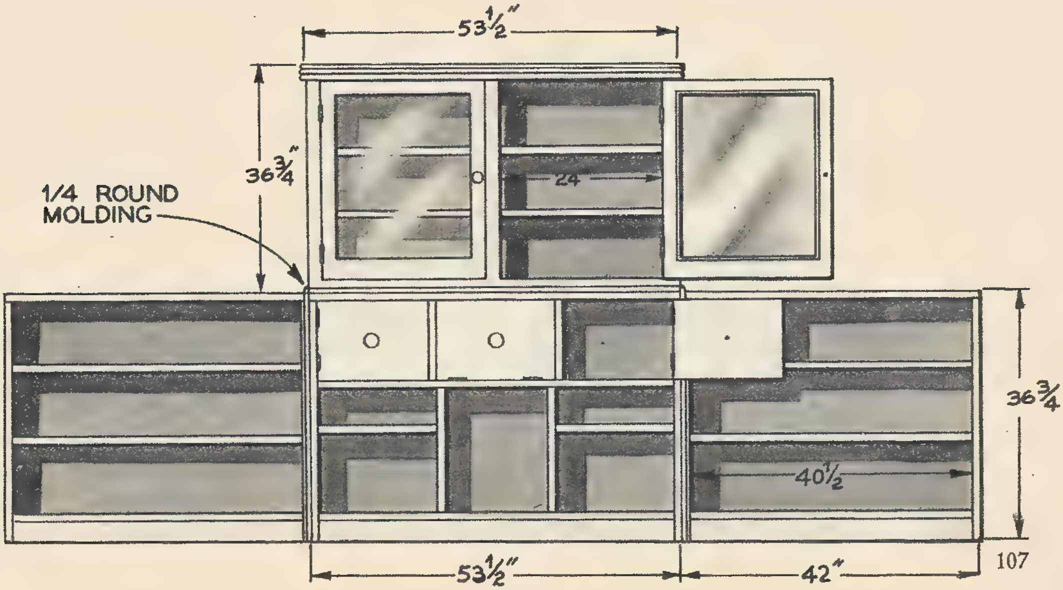
Cut the plywood back flush with all outside edges. Allow baseboard clearance if necessary. Attach with 1-in. nails spaced about 3 in. apart to give added support to the shelves.

The breakfront with room for linens, record albums and oversize books is made of 1x12 knotty pine and is 53½ in. long and 36 in. high. Assemble the top, sides and bottom in the same manner as the bookcase frames. Set the first shelf 12 in. below the top. Next insert two pieces 12 in. square for the door partitions, but do not attach until supports for the shelf have been set in place.

The left and right door wells are 16¼ in. wide and the center one is 17⅞ in. wide.


1/4" PLYWOOD BACK PANEL
1" NAILS
42"
3/4" X 10" X 42" TOP PANEL
3/4" X 10" X 40½" SHELF (3)
33¾"
3/4" X 10" X 36" END PANELS (2)
1/2" SQ. STRIP BOOK STOP (POSITION TO SUIT)
SHELVES EQUIDISTANT
3/4" X 3" X 40½" BOTTOM FACING
ALLOW CLEARANCE FOR WALL BASEBOARD
1/4" X 2" DOWELS INTO SHELVES

BOOKCASE ASSEMBLY — MAKE TWO ALIKE


53½"
36¾"
24
1/4 ROUND MOLDING
36¾
40½
53½"
42"

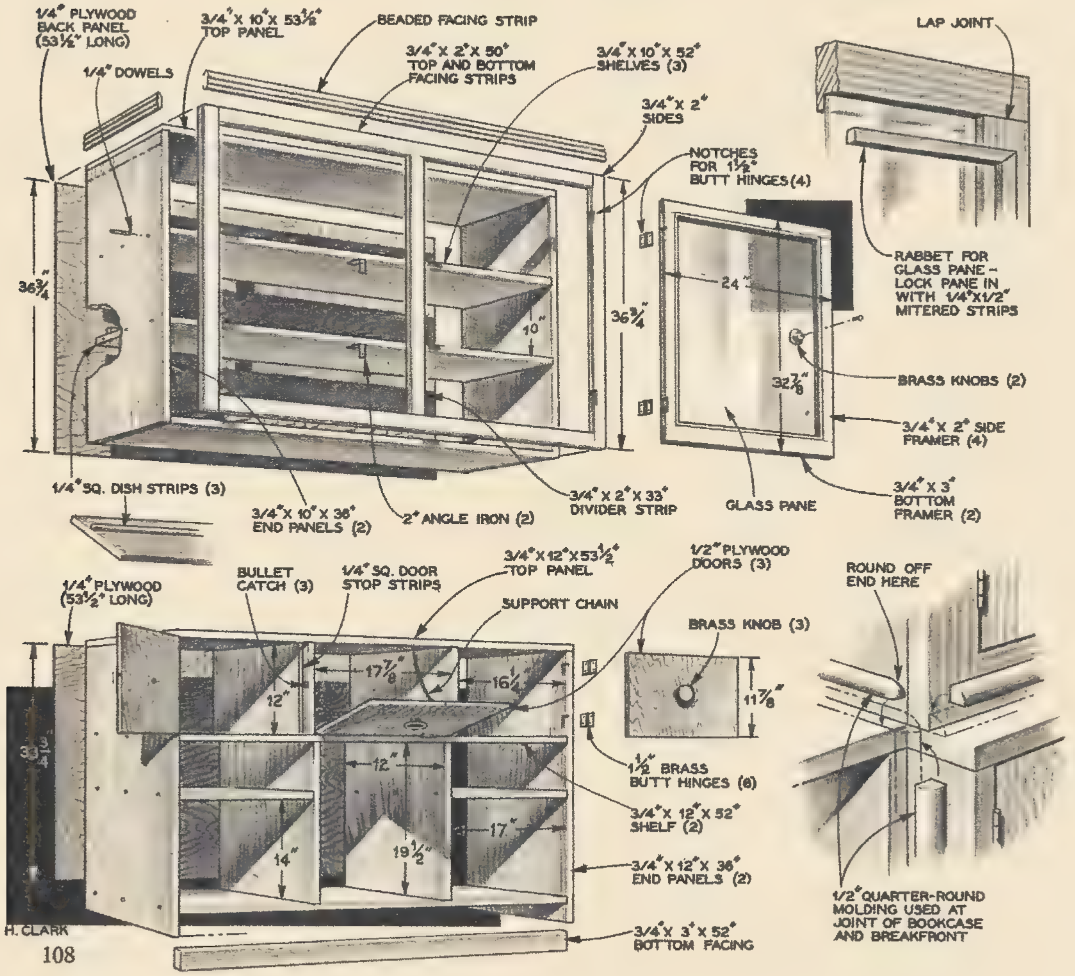
Left: You'll find a disk sander will save time and sweat. Buffing attachment eases waxing, too. Right: Strip nailed to each shelf increases book space.

All are 12 in. high. Note that door partitions or supports are offset from the lower uprights to facilitate doweling or nailing. The space for your record albums is 17x14 in. When all partitions and shelves are doweled and glued, nail on the plywood back.

The doors are made of ½-in. plywood. The dimensions for the left and right doors are identical: 16⅛ in. wide by 11⅞ in. high. These are hinged on the sides. The center door is 17¾ in. wide and 11⅞ in. high, hinged on the bottom and supported when open with lengths of brass chain. Brass pulls are set in exact center of the doors.

The china cabinet, 53½ in. long and 36 in. high, is made of 1x10-in. pine. The shelves are 52 in. long. Note that the middle shelf is 10 in. high, while the other two are 12 in. each.

Although most professionally built china cabinets have dadoed shelves to hold plates upright, comparable results can be had by nailing ¼-in. [*Continued on page* 192]


1/4" PLYWOOD BACK PANEL (53½" LONG)
3/4" X 10" X 53½" TOP PANEL
BEADED FACING STRIP
3/4" X 2" X 50" TOP AND BOTTOM FACING STRIPS
3/4" X 10" X 52" SHELVES (3)
3/4" X 2" SIDES
LAP JOINT
1/4" DOWELS
NOTCHES FOR 1½" BUTT HINGES (4)
36¾"
36¾"
10"
24"
32⅞"
RABBET FOR GLASS PANE – LOCK PANE IN WITH 1/4"X1/2" MITERED STRIPS
BRASS KNOBS (2)
3/4" X 2" SIDE FRAMER (4)
3/4" X 3" BOTTOM FRAMER (2)
GLASS PANE
3/4" X 2" X 33" DIVIDER STRIP
2" ANGLE IRON (2)
3/4" X 10" X 36" END PANELS (2)
1/4" SQ. DISH STRIPS (3)
1/4" PLYWOOD (53½" LONG)
BULLET CATCH (3)
1/4" SQ. DOOR STOP STRIPS
3/4" X 12" X 53½" TOP PANEL
SUPPORT CHAIN
1/2" PLYWOOD DOORS (3)
BRASS KNOB (3)
ROUND OFF END HERE
17⅞"
16¼"
12"
11⅞"
12"
1½" BRASS BUTT HINGES (6)
3/4" X 12" X 52" SHELF (2)
17"
19½"
14"
3/4" X 12" X 36" END PANELS (2)
3/4" X 3" X 52" BOTTOM FACING
1/2" QUARTER-ROUND MOLDING USED AT JOINT OF BOOKCASE AND BREAKFRONT
H. CLARK

Custom Sewing Kit

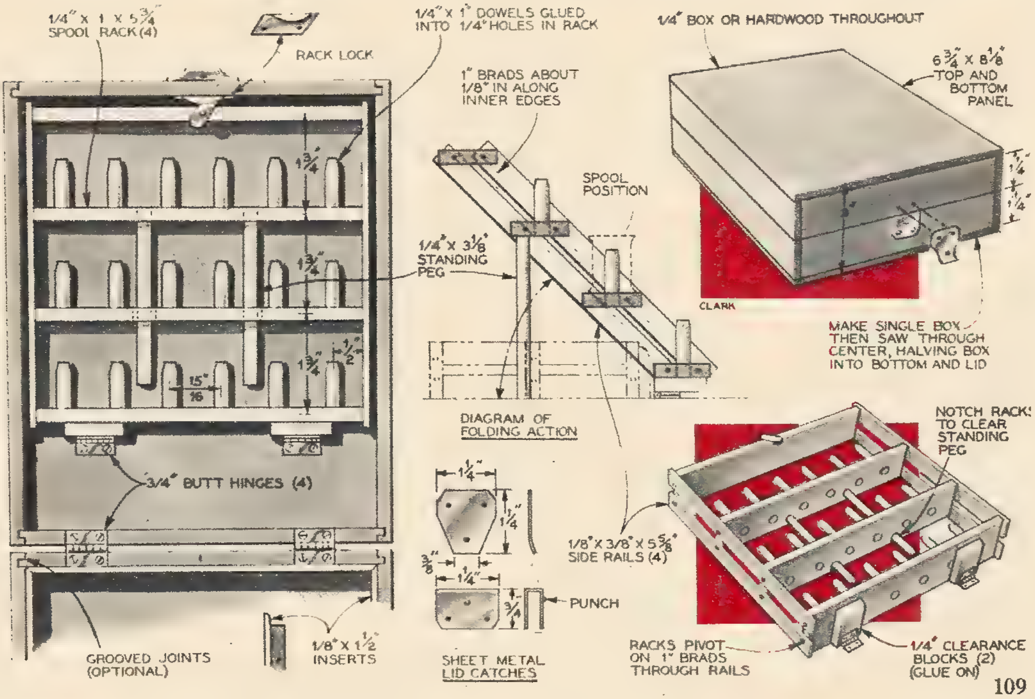
By Bertram Brownold

When assembling the spool rack, the tips of the pegs should be coated with glue and tapped firmly into their holes with the tapered ends up.

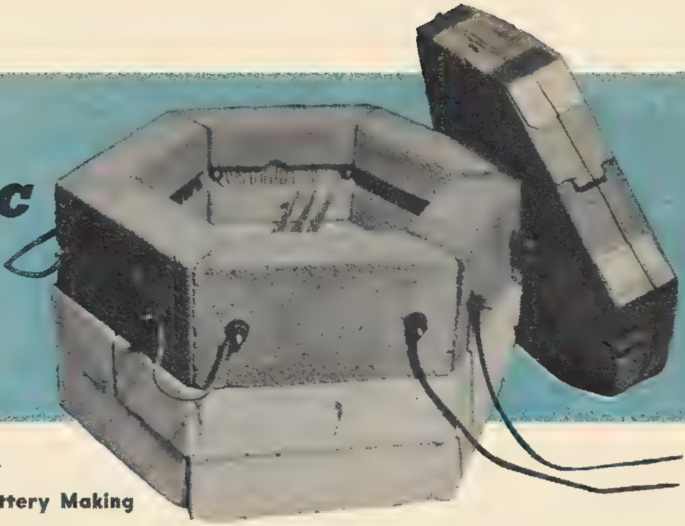
THIS little gem is something that any member of the distaff side will appreciate for years to come.

The box is made in one piece. Join and glue the corners using a grooved joint and rabbet and glue the top and bottom to the sides. Then cut the box in half to insure perfect mating. Hinge the two parts together so the box will lie flat when opened. Line the sides of the body of the box with wood strips ⅛ in. thick. The strips should stand out of the box about ⅛ in. to form a shoulder over which the lid fits. This will keep out dust and relieve lateral strain if the box is dropped or handled roughly.

In the lid of the box is a folding rack for eighteen spools of thread. The pegs of ¼ in. hardwood *[Continued on page 180]*


1/4" x 1 x 5¾" SPOOL RACK (4)
RACK LOCK
1/4" x 1" DOWELS GLUED INTO 1/4" HOLES IN RACK
1¾"
1¾"
1¾"
½"
15/16"
3/4" BUTT HINGES (4)
GROOVED JOINTS (OPTIONAL)
1/8" x 1½" INSERTS
1" BRADS ABOUT 1/8" IN ALONG INNER EDGES
SPOOL POSITION
1/4" x 3⅛" STANDING PEG
DIAGRAM OF FOLDING ACTION
1¼"
1¼"
⅜"
1¼"
¾
PUNCH
SHEET METAL LID CATCHES
1/8" x 3/8" x 5⅝" SIDE RAILS (4)
RACKS PIVOT ON 1" BRADS THROUGH RAILS
1/4" BOX OR HARDWOOD THROUGHOUT
6¾" x 8⅛" TOP AND BOTTOM PANEL
1¼"
1¼"
CLARK
MAKE SINGLE BOX THEN SAW THROUGH CENTER, HALVING BOX INTO BOTTOM AND LID
NOTCH RACKS TO CLEAR STANDING PEG
1/4" CLEARANCE BLOCKS (2) (GLUE ON)

A Ceramic KILN



By John B. Kenny
Author of Complete Book Of Pottery Making

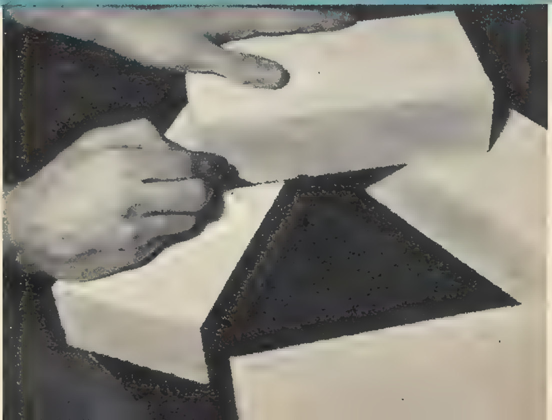
A good kiln is vital to the ceramist's craft. You can build your own by following this expert's instructions.

UNTIL recently pottery kilns were quite expensive and building your own was a difficult operation. Two new developments in the ceramic field, however, have reduced considerably the expense and the effort. One of these is a new kind of brick which combines both refractory and insulating properties. The other is a wire called Kanthal which can be used for electric elements and withstands higher temperatures than any wire elements previously known.

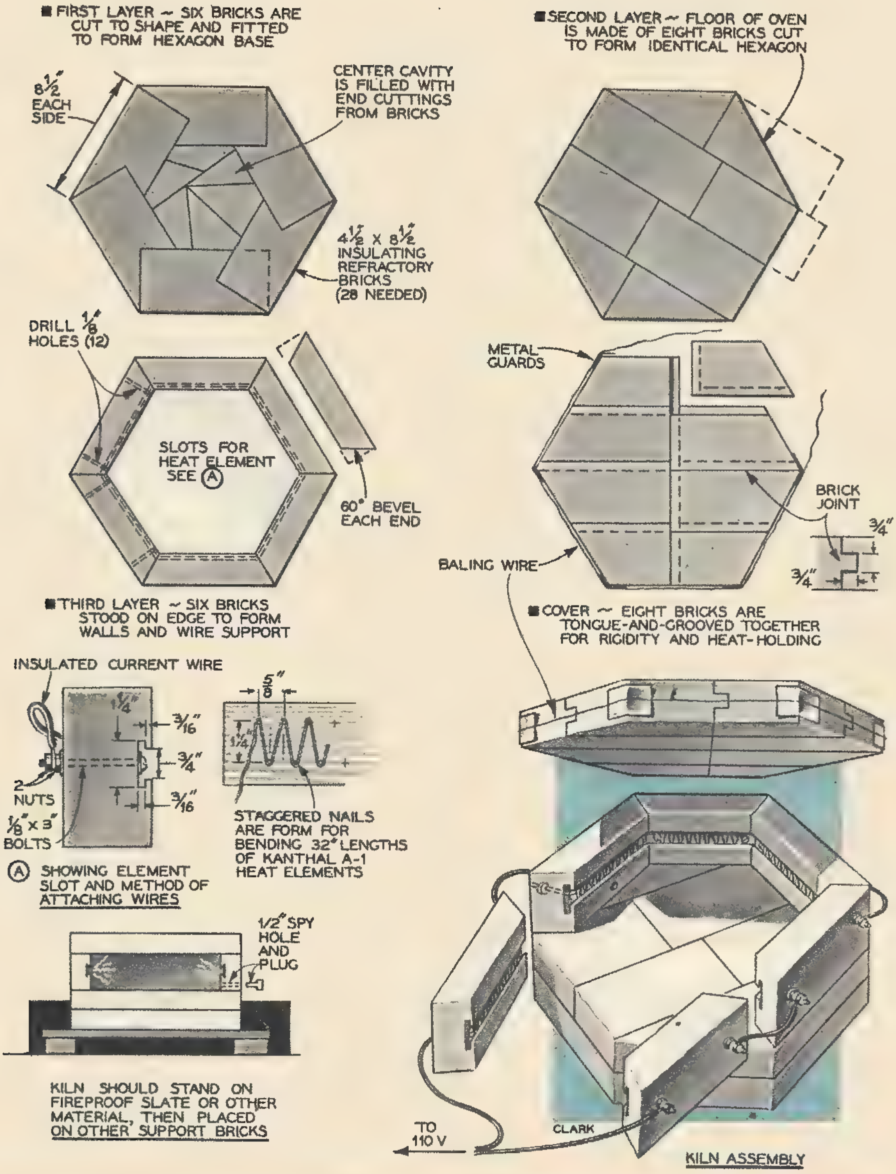
A word or two about the bricks. The problem in kiln construction is to provide generating heat—and keeping it confined. Formerly the only bricks that could be used on the inside portions of kilns were refractory bricks. These are heavy and extremely dense. They can stand high temperatures all right but they also conduct heat readily. A kiln built of such bricks alone would lose most of its heat right through the walls. When they are used for a kiln lining it is necessary to put a layer of insulating material like bloated mica or glass fiber around them and then build another layer of insulating brick on the outside. Ordinary insulating bricks are soft, porous and will not readily conduct heat. But they cannot stand high temperatures. One of these used on the inside of a kiln would crumble during firing. The new bricks, on the other hand, are porous and do not conduct heat readily, yet they can stand high temperatures. I have seen one end of such a brick held in a flame until it became red hot. The other end was still cool enough to hold in my hand.

Insulating refractory brick can be bought directly from manufacturers of refractories or from ceramic supply houses. They come in different grades, numbered 20, 22, 26, etc. The number indicates the temperature the brick will stand. No. 20 is good for 2000° F,

Make your basic hexagonal pattern on cardboard by setting compass at 8½ in. and scribing circle. Divide the circumference into six equal parts.

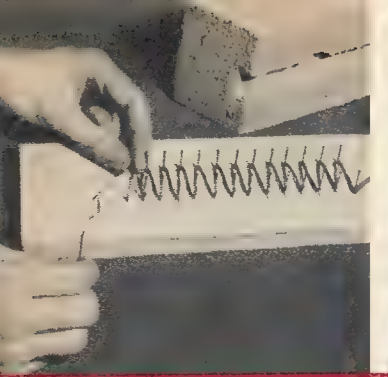


For the first layer of the kiln floor, align the bricks along the edges of your hexagon and mark off with soft pencil all the ends that will have to be cut.

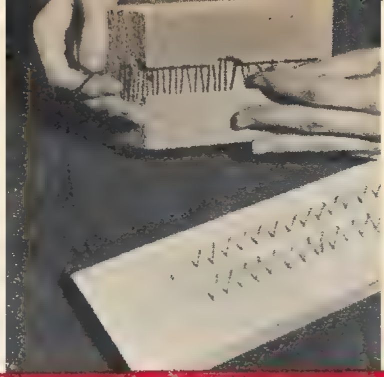

FIRST LAYER ~ SIX BRICKS ARE CUT TO SHAPE AND FITTED TO FORM HEXAGON BASE
8½ EACH SIDE
CENTER CAVITY IS FILLED WITH END CUTTINGS FROM BRICKS
4½" X 8½" INSULATING REFRACTORY BRICKS (28 NEEDED)
SECOND LAYER ~ FLOOR OF OVEN IS MADE OF EIGHT BRICKS CUT TO FORM IDENTICAL HEXAGON
DRILL ⅛" HOLES (12)
SLOTS FOR HEAT ELEMENT SEE Ⓐ
60° BEVEL EACH END
THIRD LAYER ~ SIX BRICKS STOOD ON EDGE TO FORM WALLS AND WIRE SUPPORT
METAL GUARDS
BRICK JOINT
¾"
¾"
BALING WIRE
COVER ~ EIGHT BRICKS ARE TONGUE-AND-GROOVED TOGETHER FOR RIGIDITY AND HEAT-HOLDING
INSULATED CURRENT WIRE
1¼"
3/16"
¾"
3/16"
2 NUTS
⅛" x 3" BOLTS
Ⓐ SHOWING ELEMENT SLOT AND METHOD OF ATTACHING WIRES
5/8"
1¼"
STAGGERED NAILS ARE FORM FOR BENDING 32" LENGTHS OF KANTHAL A-1 HEAT ELEMENTS
1/2" SPY HOLE AND PLUG
KILN SHOULD STAND ON FIREPROOF SLATE OR OTHER MATERIAL, THEN PLACED ON OTHER SUPPORT BRICKS
TO 110 V
CLARK
KILN ASSEMBLY

A hand saw, specifically a back saw, is the best tool for making these cuts. Do not discard the scraps—they will complete the kiln's first layer.

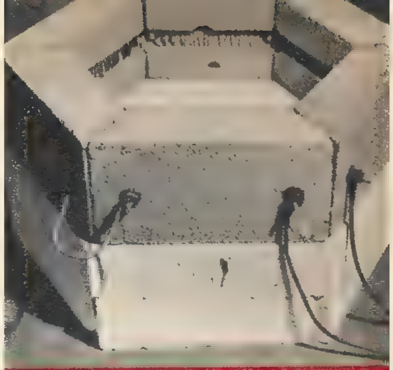
The channel for the electrical element may be dug out with a chisel, but this accessory tool will save lots of time. (See text for details.)



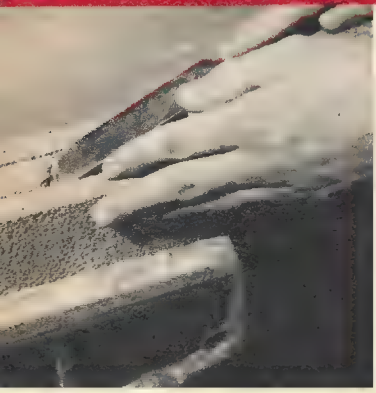
To facilitate getting electrical element to proper shape, nail some brads to a piece of scrap and bend wire around them as shown.



Bricks are wired individually. One of the two ⅛-in. holes for the binding posts is visible at left. Note angle of brick end.



Assembled kiln without the top. Use No. 14 single-strand wire to connect binding posts. Two wires at right lead to male plug.



Tongue-and-groove all joints of the kiln top, employing the same technique used in making the notches for electrical element.

Cut the tongues about ¾ in. high. For maximum heat conservation use this type of joint on the brick ends as well as the sides.

Rub bricks together to assure a good, snug fit. You will need eight properly cut bricks in all to complete the lid of the kiln.

No. 22 will go to 2200°, and so on. For the kiln we are going to build, No. 22 or 26 will do. We shall need a total of 26 bricks.

Kanthal wire or ribbon is made of an alloy recently developed in Sweden. It can stand temperatures up to 2460°—hot enough to fire stoneware or even low-temperature porcelain. It can be purchased from the C. O. Jellife Co. of Bridgeport, Connecticut.

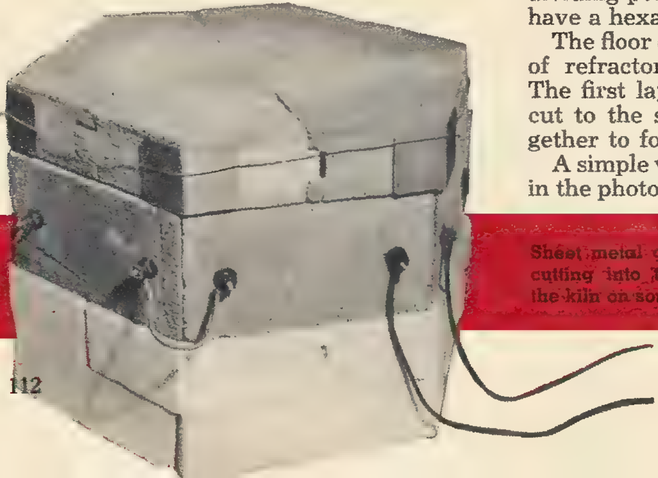
A number of potters have built small hexagonal kilns, using the bricks described above, and have wired them with Kanthal elements. Such kilns are inexpensive, easy to make and quite satisfactory in operation. Here is how the job is done.

Start by drawing a hexagon with sides 8½ in. long (the length of a brick). To do this set a compass for a radius of 8½ in. and draw a circle. With the compass at the same setting, divide the circumference of the circle into six equal parts. Connect the dividing points with straight lines and you have a hexagon.

The floor of the kiln is made of two layers of refractory insulating brick lying flat. The first layer will be made of six bricks cut to the shape shown and then put together to form a hexagon.

A simple way to plan the cutting is shown in the photographs.

[*Continued on page* 174]



Sheet metal guards prevent the baling wire from cutting into the bricks. For safety's sake, stand the kiln on some fireproof material when it's in use.

double duty drill stand

By R. Lieto

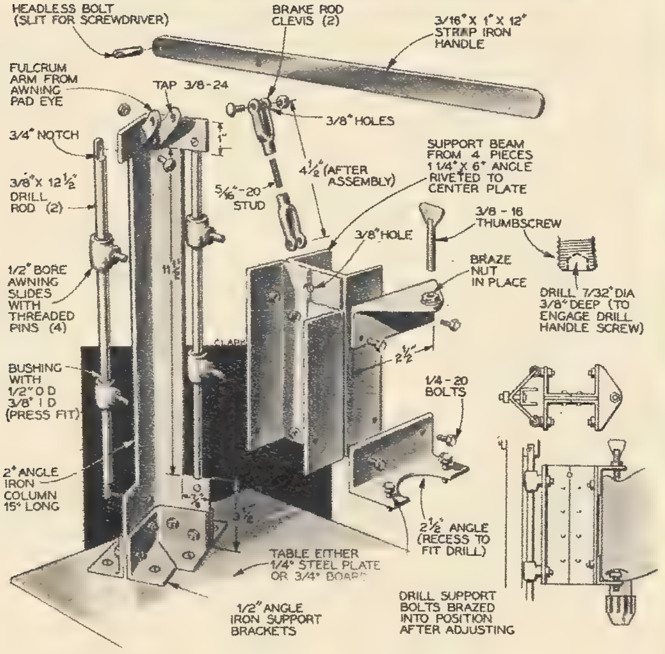
FABRICATED entirely without castings, only the most elementary tools are used in the construction of this drill stand. With a flick of your wrist (one thumbscrew clamps the drill body), you can convert your ¼-in. electric drill into a durable and accurate machine tool. The drill holder, when removed from the slides and bolted to your workbench, transforms your machine into a stationary grinder or buffer.

While the holder was designed for a Black and Decker quarter-in. drill, clamping details can be [*Continued on page* 182]

Above: Stand in actual operation. For best results the assembly should be screwed down to work table. Note how the cord is suspended.

Left: Drill becomes a firmly held grinder or buffer in this position. The trigger switch is held down by a catch built into the machine.

Below: Adjustment of thumbscrew enables you to remove or insert machine. Thumbscrew engages screw on the tool, will not mar housing.


HEADLESS BOLT (SLIT FOR SCREWDRIVER)
BRAKE ROD CLEVIS (2)
3/16" X 1" X 12" STRAP IRON HANDLE
FULCRUM ARM FROM AWNING PAD EYE
TAP 3/8-24
3/8" HOLES
3/4" NOTCH
1"
3/8" X 12½" DRILL ROD (2)
4½" (AFTER ASSEMBLY)
5/16"-20 STUD
SUPPORT BEAM FROM 4 PIECES 1 1/4" X 6" ANGLE RIVETED TO CENTER PLATE
3/8-16 THUMBSCREW
3/8" HOLE
BRAZE NUT IN PLACE
DRILL 7/32" DIA 3/8" DEEP (TO ENGAGE DRILL HANDLE SCREW)
11½"
1/2" BORE AWNING SLIDES WITH THREADED PINS (4)
2½"
BUSHING WITH 1/2" O D 3/8" I D (PRESS FIT)
1/4-20 BOLTS
2" ANGLE IRON COLUMN 15" LONG
3½
2½" ANGLE (RECESS TO FIT DRILL)
TABLE EITHER 1/4" STEEL PLATE OR 3/4" BOARD
1/2" ANGLE IRON SUPPORT BRACKETS
DRILL SUPPORT BOLTS BRAZED INTO POSITION AFTER ADJUSTING

THE MODEL MAKER'S ROUNDHOUSE

SO YOU'RE GOING TO BUY A RAILROAD . . .

AT one time or another nearly every one has felt the urge to get into model railroading as a hobby. There is small chance for boredom, for there is a wide range of crafts and skills that contributes to model railroading. Aside from the fascinating locomotives and cars, there are the attendant structures and scenic accessories to stimulate your imagination in assembling a natural setting for your equipment.

Probably the most discouraging thing about getting started is to decide which gauge or scale to use, and whether to make use of ready-built "tinplate" equipment or accurate scale equipment which is supplied in kits, requiring some assembly and craftsmanship to create the finished product. The battle of the gauges has raged for years with a strong tendency towards the smaller sizes. In a survey taken by Model Railroader magazine ten years ago, 36 per cent worked HO gauge compared to 58 per cent in O gauge. By 1950 the ratio had shifted to 69 per cent in favor of HO gauge, the smaller gauge. There is no such thing as a best gauge. It all depends on *your* space and interests.

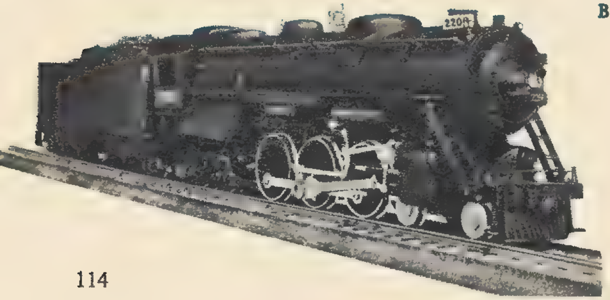
At present kits, parts, track and equipment are available for five gauges: TT, HO, OO, S, and O, plus tinplate. Tinplate, even in the same scale, *requires different track and wheels.* American Flyer tinplate trains are made in HO and S scales; Lionel and Marx trains in O scale. The 027 Lionel track merely refers to a track capable of being laid out in a 27 in. circle, not to a different track width.

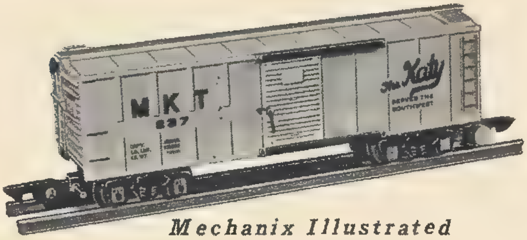
First let's see how the radius of curvature would affect your choice of gauge. In O gauge, using scale equipment you would need a 9x9 ft. area for a simple circle, and much more for complicated track arrangements. The Lilliputian or TT size could circle around a card table. The minimum radii given on the chart will permit operation of most equipment, except such giants as 4-6-6-4, articulated or 2-10-4 Texas-type locomotives.

You will be wise to use *at least* the recommended minimums because it will pay off in trouble-free operation. If you have a specialty in mind, such as a trolley line, or an industrial or dockside switching layout, it is practical to reduce the minimum curves. A very complete layout of this type can be built on a card table or a shelf perhaps one or two ft. wide, six to eight ft. long.

Next comes the matter of appearance, or realism. The larger gauges, such as O gauge, naturally have finer detail and more working parts. The smaller sizes are not oversimplified toys, but have a surprising amount of detail for their size. Suppose you have an O gauge train with a locomotive, tender and six Pullman cars. This will stretch out to about ten ft. If you are cramped for room, there wouldn't be much

Left: A Varney 4-6-4 locomotive in HO scale. Below: American Flyer tinplate box car, S scale.



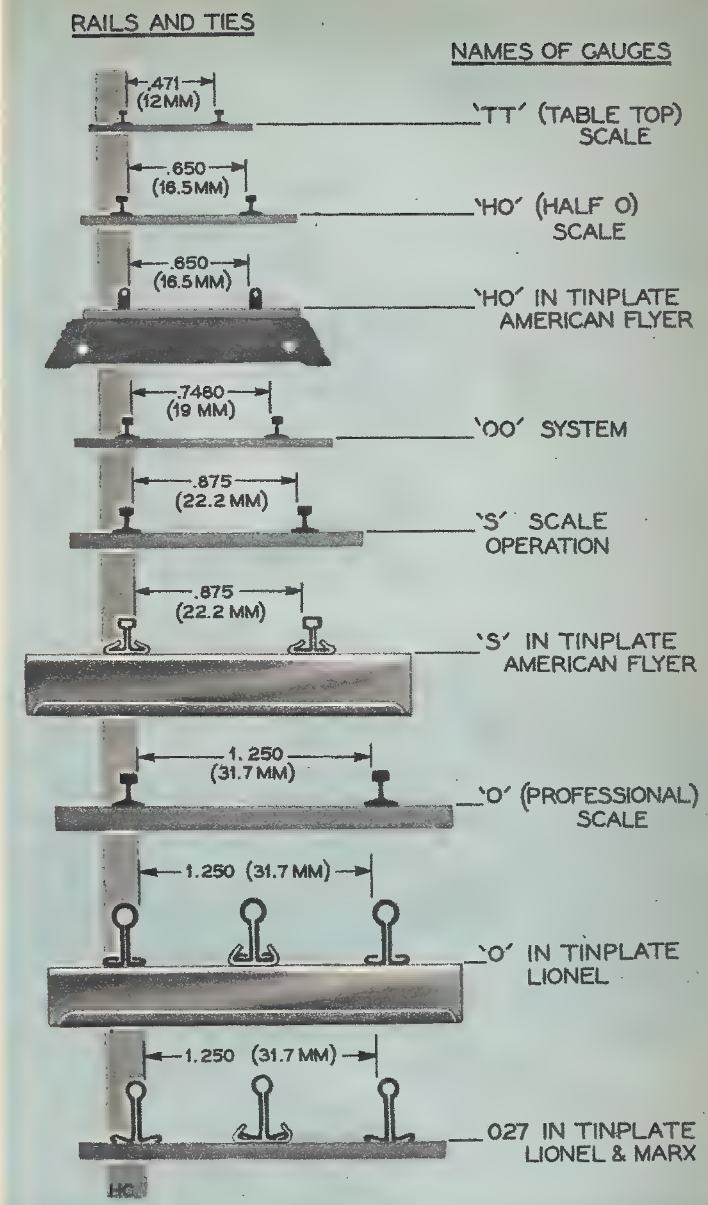


realism for a ten-foot train to snake around a layout only 15 or 20 ft. long. The answer then is a smaller gauge trolley or switching layouts. Such pikes with their curves of shorter radii can be fitted into apartment size layouts even in O gauge.

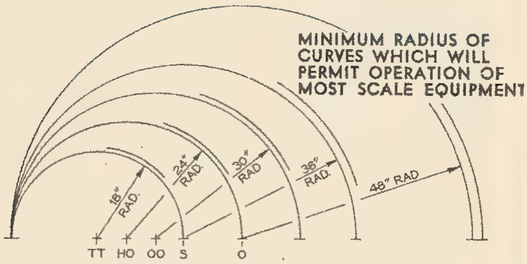
A different kind of realism is produced in the smaller gauges. Instead of models with extra fine details the effect of realism is produced by looking at the train or layout as a whole. Since the trains are so tiny, there can be a more realistic proportion of scenery to railroad tracks than is usually possible in the larger scales. And don't let their size fool you—those little fellows can pull up to 40 cars!

Another factor influencing choice of gauge is availability. At the present time the largest number of scale model railroads are in HO gauge, with O, S, TT, and OO following in that order of popularity. The fastest growing scale at the present time is TT with its appeal to those with the smaller space. The number of sources of supply and variety of products are also in about the same order as gauge popularity.

The varieties known as tinplate are so-called because of the material used in constructing their tracks. The advantages of tinplate equipment is that a very wide variety of equipment, track and accessories are available in a ready-made form which can be assembled into an


RAILS AND TIES
NAMES OF GAUGES
.471 (12MM)
'TT' (TABLE TOP) SCALE
.650 (16.5MM)
'HO' (HALF O) SCALE
.650 (16.5MM)
'HO' IN TINPLATE AMERICAN FLYER
.7480 (19 MM)
'OO' SYSTEM
.875 (22.2 MM)
'S' SCALE OPERATION
.875 (22.2 MM)
'S' IN TINPLATE AMERICAN FLYER
1.250 (31.7 MM)
'O' (PROFESSIONAL) SCALE
1.250 (31.7 MM)
'O' IN TINPLATE LIONEL
1.250 (31.7 MM)
027 IN TINPLATE LIONEL & MARX
HC

The tracks above are drawn to exact scale.


MINIMUM RADIUS OF CURVES WHICH WILL PERMIT OPERATION OF MOST SCALE EQUIPMENT
18" RAD.
24" RAD.
30" RAD.
36" RAD.
48" RAD
TT
HO
OO
S
O

In response to a great many letters, MI inaugurates this month the new department appearing on these pages. It will be devoted to the needs and interests of the model railroad fan, whether he be a dyed-in-the-wool scale fan or a parlor tinplate enthusiast. This is *your* department. Let us know what type of articles you would like to have us print and what you think of our new venture. Drop us a line, a post card will do, to, The Model Maker's Roundhouse, care of *MECHANIX ILLUSTRATED* Magazine, 67 West 44th St., New York 18, N. Y.

THE MODEL MAKER'S ROUNDHOUSE

COMPARISON OF SCALE MODELS*

Name of gauge	TT	HO	OO	S	O
One foot equals	1/10 in. 2.7mm	.1378 in. 3.5mm	.1575 in. 4mm	3/16 in. 4.8mm	¼ in. 6.3mm
Track gauge (minimum distance between insides of rails)	.471 in. 12mm	.6496 in. 16.5mm	.7480 in. 19mm	.875 in. 22.2mm	1.250 in. 31.7mm
Suggested minimum radius of curvature for track to permit operation of scale equipment	18	24	30	36	48
Suggested minimum radius of curvature for industrial switching or trolley layout	5	6	7	8	9
Length of scale locomotive and tender (Hudson-type)	9¼	12½	14⅜	17¼	23
Length of 45 ft. box car	4½	6¼	7⅛	8½	11¼
Length of Pullman	8¼	11	12⅞	15⅜	20½
TINPLATE					
Tinplate curve radii as supplied by manufacturers	X	16 Amer. Flyer	X	20 Amer. Flyer	12½ 14½ 36 Lionel
Length of locomotive and tender (Hudson-type)	X	14	X	21½	23
Length of box car	X	5 3/16	X	9⅞	9¼
Length of Pullman	X	9	X	10¾	11¾

*All figures refer to inches unless otherwise noted.

operating layout with the minimum of construction or skill. Certain features such as sound and smoke are found only in tinplate equipment. The curves are relatively sharp in proportion to the size of equipment. This makes for a compact layout with the disadvantage, however, of requiring some rolling stock to be built shorter than scale in order to get around the curves plus gaps between cars due to wider coupling. Many fans buy tinplate equipment, and by lathe work on the wheels and a few other steps convert it for scale operation. Solid brass rail is available for those who wish to use tinplate equipment on a more realistic track.

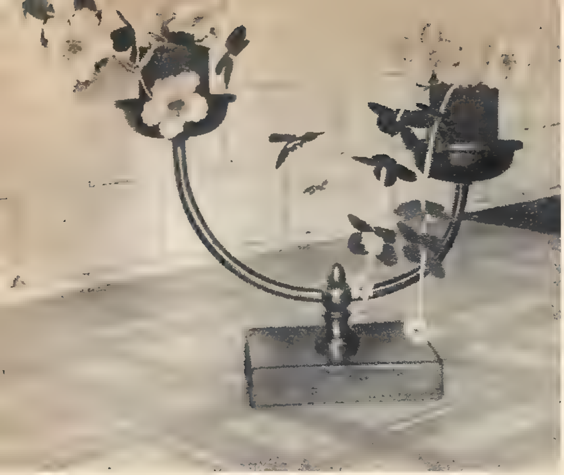
Many model railroad fans start in at the tender age of six or seven because of a gift bestowed by a doting uncle or parent. Invariably it is a tinplate railroad and as a rule, the recipient gets very little chance to operate said railroad. Assembly and control is usually in the hands of the doting parent until said parent has become thoroughly satiated. Then it is placed in the not-too-secure hands of the youngster for whom it was originally intended. After a while this pattern develops: The parent himself gets interested in model railroading and as an excuse not to tamper with junior's equipment he buys scale equipment for *his* own use.

A scale enthusiast would rather pick up a red-hot rivet with his bare hands than place or push a balky train onto the right track. Everything must be done by remote control. Realism is carried to the nth degree. If he hasn't got room to construct a true roadbed to scale, he will invariably make some sort of specialized pike, true to scale, such as a steel mill railroad, a dockside switcher or even a freight line terminal. In these cases the fan can justifiably use curves of sharper than normal radius and still be sure that his layout follows the prototype in all respects.

Model railroad men take their hobbies very seriously. They support three magazines, Model Railroader, Model Craftsman, and HO Monthly. The National Model Railroad Association with home offices in Canton, Ohio, forms a sort of loose clearing house for the various publications and clubs.

Scale model rolling stock is of scale length as well as scale cross section, and is almost as close-coupled as the prototype, whereas tinplate rolling stock is much shorter than scale length and is excessively "long-coupled." In this country, tinplate is produced almost exclusively by Lionel and Louis Marks and Co., of New York and A. C. Gilbert in New Haven, Conn. Components for scale models and in some instances complete scale models are produced by a host of individuals and firms from New England to California.

To add to the general confusion, which we hope we have somewhat clarified with this article, models of still different scales and gauges are made in Germany and England and are being imported by several firms.—*Homer Hansen*



desk lamp projects

Your old discarded desk lamp can be rebuilt into a modern flower holder or wall light.

By R. J. DeCristoforo

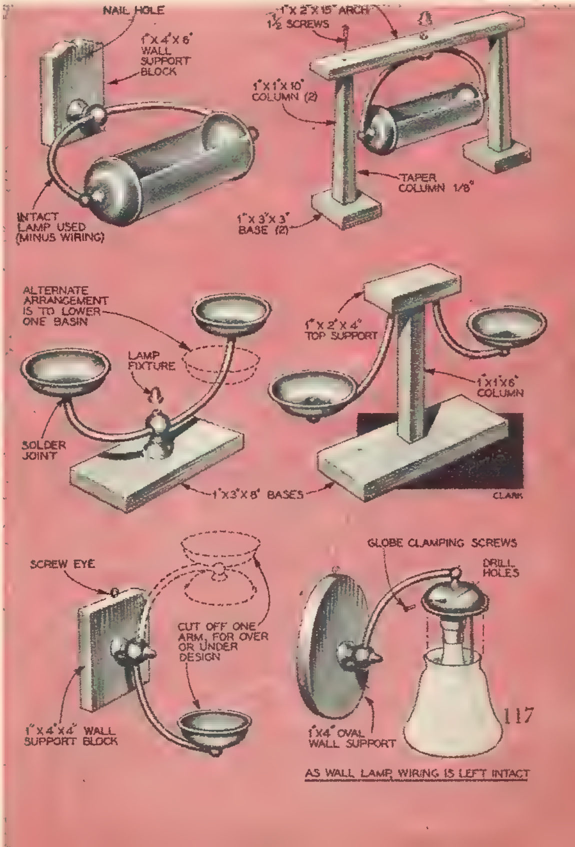
IF you don't have an old desk lamp no longer being used for its original purpose, then I suggest you beg, borrow or steal one, for you'll want to make one of the projects described in this article. It's easy to see what the old lamp can be transformed into.

The easiest project would be to remove the wire, socket and bulb and reverse the shade while the unit is still on its original base. Now it is a novel flower bed.

More elaborate setups can be arranged if you follow the pictures and drawings. Fixed up with a nice flower setting it is hard to imagine it as an ex-desk lamp. Also, the shade can be turned and the unit mounted on a small plaque. It now becomes a wall flower holder. Before using it in this manner it would be wise to check the shade with water and if it leaks go over the joints with solder or waterproof cement.

If you decide on any of the following projects you will have to cut away the center section of the shade. Use snips to do this and file off any sharp edges. The remaining cup like piece makes a neat holder for a small flower pot. Mounted on a base, you might use the original base, it makes a modern [*Continued on page* 185]

Above: An attractive wall lamp made from half of your worn out desk lamp. Below: A good flower arrangement transforms lamp into centerpiece.

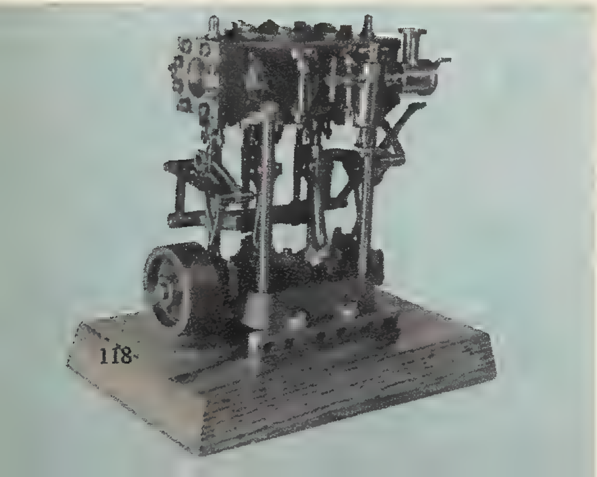

NAIL HOLE
1" X 4" X 6" WALL SUPPORT BLOCK
INTACT LAMP USED (MINUS WIRING)
1" X 2" X 15" ARCH
1½ SCREWS
1" X 1" X 10" COLUMN (2)
TAPER COLUMN 1/8"
1" X 3" X 3" BASE (2)
ALTERNATE ARRANGEMENT IS TO LOWER ONE BASIN
LAMP FIXTURE
SOLDER JOINT
1" X 2" X 4" TOP SUPPORT
1" X 1" X 6" COLUMN
1" X 3" X 8" BASES
CLARK
SCREW EYE
CUT OFF ONE ARM, FOR OVER OR UNDER DESIGN
1" X 4" X 4" WALL SUPPORT BLOCK
GLOBE CLAMPING SCREWS
DRILL HOLES
1" X 4" OVAL WALL SUPPORT
AS WALL LAMP, WIRING IS LEFT INTACT

WORKBENCH AWARD *Winners*

EACH of the craftsmen whose projects are pictured here will receive a $5 check and a *Workbench Award* certificate. How about sending us a photo and brief description of your latest project? Even if your work isn't one of the winners, it may still receive a *Certificate of Merit.* Photographs of your workshop are also eligible for an award. Send your entry to MECHANIX ILLUSTRATED Workbench Awards, 67 West 44th Street, New York 18, N. Y.

Radio-Phonograph. Robert Elford of Hamilton, N. Y. is justifiably proud of this fine piece of cabinetry. These three units were constructed of butternut wood, finished with three coats of varnish and rubbed down to satin finish with pumice and water.

Model Clipper. A fine job of modeling by David P. Hammond of Chincoteague, Va. It was built in a year of spare time from a kit. The ship, a Baltimore clipper of 1812, is 20 in. long and represents Mr. Hammond's very first attempt at model making.



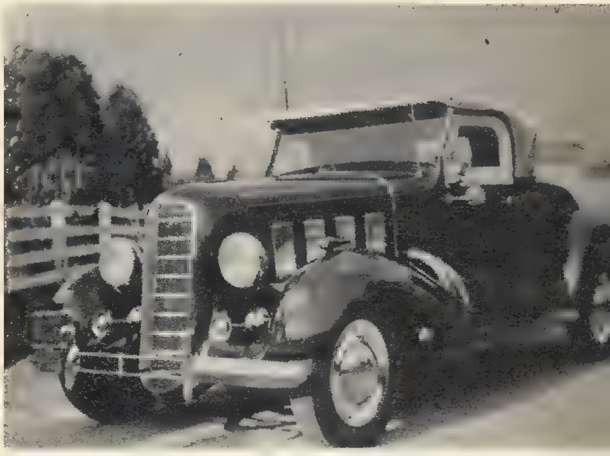
Working Marine Engine. A superb example of metal-working built by Carlton Nelson of Hartford, Conn. It contains 396 parts and will turn over on 15 pounds of steam obtainable from a pressure cooker. A labor of love, it took seven years to make.

Curtiss Hawk. This model, built by Denzil Locke of Brinston, Ont., originally appeared in MECHANIX ILLUSTRATED in the Nov. 1949 issue. It is powered by a Class B (glow plug) engine and a nine inch two-bladed propeller. A fine paint job, too.

SUNDAY
PAPERS
PHONE 1834M

Bike Trailer. Mike Daugherty and his father, of Marietta, O., built this handy trailer to help Mike on his paper route. It is made of a candy box, scooter wheels and black iron pipe. In no way does it interfere with the regular action of the bike.

Model A Sportster. Leroy Bankert of Hanover, Pa., cannibalized a Cadillac for fenders and grill, a Chevrolet for the hood, a Lincoln for bumpers and a Hudson for a tail light. Basic framework consists of a Model A Ford. Project cost around $500.



Bouncie II. Built by Phil Kennedy of Las Vegas, Nev. from MI Plan No. 388. The deck is of solid mahogany with the cockpit upholstered in red leather. Mr. Kennedy writes that the boat handles beautifully and has been clocked at a speed of 48 mph.

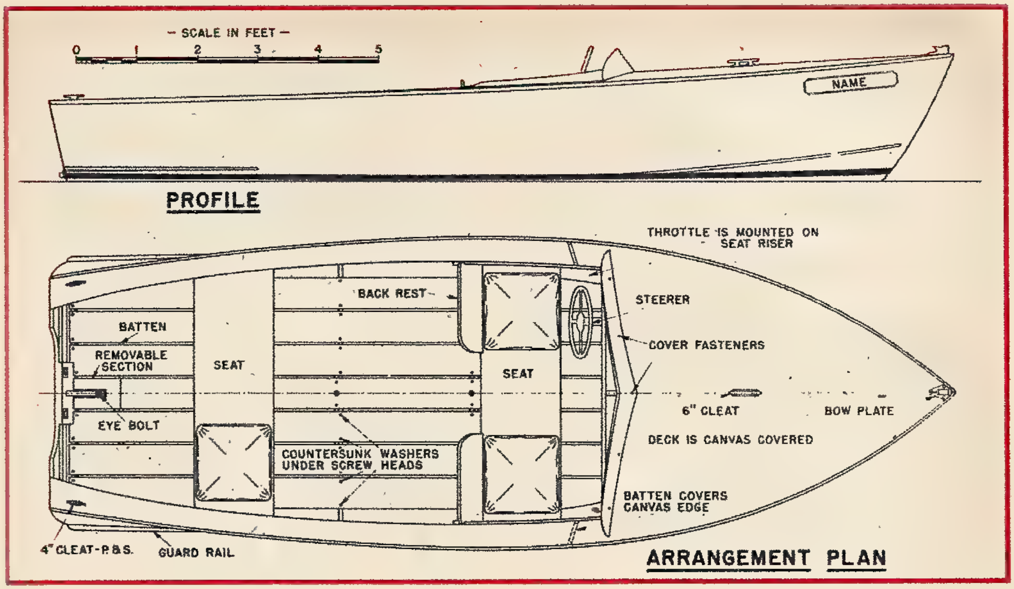
how to build MERRY MAID

Plywood 15-ft. runabout. Displacement: 910 lbs. Beam: 5 ft. For 10 to 16-hp. motors. Speed: 20 mph.

By Charles M. Ungerbuehler, *Yacht Designer*

MERRY Maid was designed for the man who desires a roomy little runabout capable of good speed and having rough-water ability. With her graceful, sweeping sheer, she is a saucy little packet. She has completely pleased her original owner and may interest those of you who desire an inexpensive, easily built boat.

Powered with a Mercury Super Ten and carrying two passengers, the prototype ran from Seaford, Del., to Nanticoke, Md., and return, a distance of approximately 80 miles, in 4 hours and 15 minutes without ever having had the motor wide open. Under way, *Merry Maid* runs cleanly at either high or low



— SCALE IN FEET —
0
1
2
3
4
5
NAME
PROFILE
THROTTLE IS MOUNTED ON SEAT RISER
BACK REST
STEERER
BATTEN
REMOVABLE SECTION
SEAT
COVER FASTENERS
SEAT
6" CLEAT
BOW PLATE
EYE BOLT
DECK IS CANVAS COVERED
COUNTERSUNK WASHERS UNDER SCREW HEADS
BATTEN COVERS CANVAS EDGE
4" CLEAT-P.&S.
GUARD RAIL
ARRANGEMENT PLAN

speed, banks beautifully, and has sufficient stability, despite her light weight, to allowing a couple of passengers to sit on the side decking without fear of being tossed overboard. The boat is large enough so the passengers sit down in it rather than on it.

Now let's get on with the construction. First there is a job you must do and do right. This is laying down the lines full size. The time spent doing this job will be well repaid later on.

On edge-butted sheets of Beaverboard, strike in a straight line. This serves as the base for the profile and the center line for the plan, one drawing being superimposed on the other. Draw each section on a separate piece of heavy paper. The frames will be made up directly on these section drawings, so draw in all construction on each.

The boat can be built over a rigidly braced form cut to the shape of the top edge of the keel batten and notched for the frames at the proper intervals. Or it can be built by extending the side frames to the inverted building base line. In either case, be sure that the base you build from is straight and perfectly level and that all the frames with the exception of the transom stand perfectly plumb to this base at the proper spacing. A spreader should be fastened to the head of each frame at the sheer as it is made and marked with a center line. These center-line marks must all line up after the frames are erected on the keel batten.

Specifications and Instructions

Keel. White oak, ¾x2 in.

Keel Batten. White oak, 1x3½ in. Fasten to keel with 1½-in. No. 8 screws on 4-in. centers.

Stem. White oak, 2 in. thick, molded as shown.

Stem Knee. White oak, 2 in. thick, molded as shown.

Lower Stem. White oak, 2 in. thick, molded as shown. Secure stem, stem knee, and lower stem together with six ¼-in. carriage bolts. Fasten to keel assembly with three ¼-in. carriage bolts. Set bolt heads in counterbores and plug them. Install three white-pine stopwaters, as shown, in the joints where they pass the rabbet. Fit cheek pieces to bolster out the back rabbets to take the planking. These are shown in a detail.

Floor Timbers. White oak, ¾x2 in. above top of keel batten. To be 16 in. long in after frames. Forward, the lengths must reduce because of the angle of the bottom. Secure each timber to the keel batten with one ¼-in. carriage bolt.

Bottom Frames. White oak, ¾ in. thick, 2 in. wide at keel, 2¼ in. wide at chine. Fasten each to its floor timber with six ¼-in. machine bolts with washers under both heads and nuts. Fasten each to the keel batten with two 1½-in. screws. Cut limber holes, 1 in. in diameter, in the bottom frames and floor timbers as shown.

Side Frames. White oak, ¾ in. thick, 2 in. wide at head, 2¼ in. wide at heel. Secure each side frame to its bottom frame with two ¼-in. machine bolts with washers under both heads and nuts.

Chines. White oak, ¾x1¾ in., notched into side frames and transom frame and boxed into stem. Fasten with one 1¾-in. screw at each joint.

Stringers and Sheer Battens. White oak, ½x1½ in., notched into side frames and transom frame and boxed into stem. Note that bottom stringers end at frame No. 5. Secure with one 1¼-in. No. 10 screw at each joint.

Transom. Of ¾-in. plywood. Fit framing, motor board, and cleats as shown. Add plywood gussets at the chines. The fastenings are 1¼-in. No. 10 screws. Secure transom to keel assembly with a knee that is securely bolted in place.

Side Planking. Of ¼-in. plywood. A 4x16-ft. panel when ripped diagonally will plank both sides. From 12 in. aft of frame No. 5 to the stem, the bottom planking does not lap the side planking, but butts against it. Clamp the side planking in place, mark at sheer and chine, remove, and rough cut. Carefully prepare for the butt joint mentioned above. Coat all faying surfaces with glue and fasten the planking in place, using ¾-in. screws on 2-in. centers into the frames, chines, and stem and ⅝-in. screws on 3-in. centers into the stringers. There should be a double row of fastenings at the transom. Carefully trim along the chines from 12 in. aft of frame No. 5 to the stern to take the bottom planking.

Bottom Planking. Of ¼-in. plywood. Apply and fasten in same manner as side planking. Slightly countersink all fastenings in side and bottom planking, fill with a putty such as Duratite, and sand smooth.

Chine Caps. White oak, ¼x1 in., glued and screwed to corners of chines to cover planking joints. Bevel top edges and fair bottom edges flush with bottom planking. Do not round off aft of frame No. 3 or speed will be reduced. The boat is now ready to be turned over.

Deck Beams. White oak, ¾ in. thick, 2 in. wide after cutting to radii sufficient to give the desired rise. Fasten each to the head of each frame with two 1¼-in. No. 10 screws. Fasten intermediate beams to short sections of framing that are secured to sheer battens and planking. Gradually diminish the cambers of the short side beams as you work aft so the side decking will properly fair into the transom top.

Dash. Mahogany, ¾ in. thick. Fasten to deck beam No. 4.

Breasthook and Knees. White oak, 1 in. thick. Secure at stem, dash, and transom with 1½-in. No. 10 screws.

Carlings. White oak, ¾x1¼ in., fastened to knees and beams with 1½-in. No. 10 screws.

Fairleads. Pieces of copper tubing, ½ in. in diameter, set in suitable holes bored in the side frames, flared both ends. Line them up to allow the steering cable to run in as straight a line as possible. Install housed sheaves at the transom to allow the cable to make the turns to the motor arms.

Deck Partner. White oak, ⅝x3 in. Let into deck beams, box into breasthook, and secure at each joint with two 1¼-in. No. 8 screws.

Coamings. Plywood, ¼x3 in. Run from transom to dash and secure to carlings with ¾-in. screws.

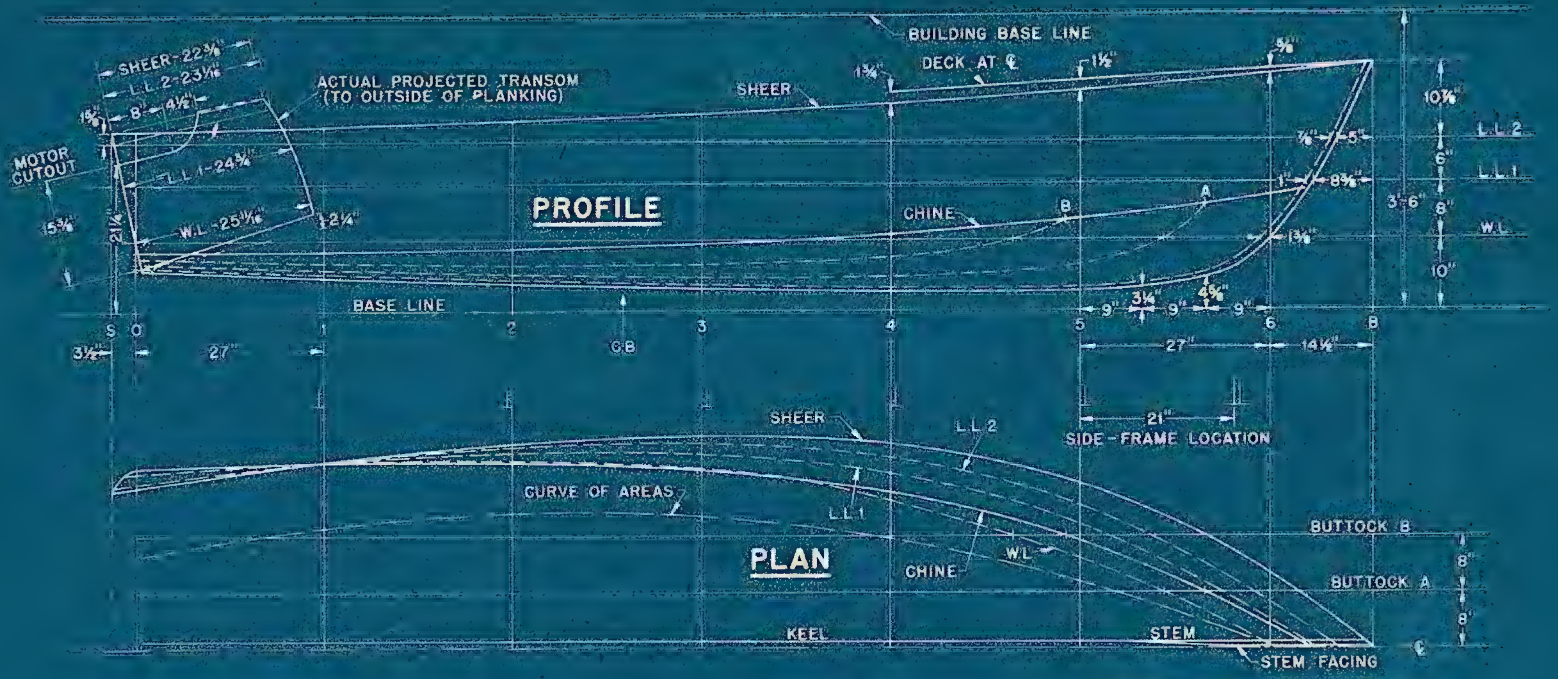
Decking and Planksheers. Of ¼-in. plywood. Deck can be in two pieces joined at the partner. Planksheers butt against deck at the dash. Secure to beams with ¾-in. screws on 4-in. centers. Round off inner edges of planksheers except in way of the cockpit facings.

Deck Covering. Of 8-oz. canvas, in one piece, cemented to deck. Turn edges down over dash and sheer and secure with closely spaced copper nails. Cover edges of canvas on the planksheers with small battens, as shown. After laying, apply one thin coat of canvas cement and two thin coats of marine paint. Be sure that all deck fastenings are puttied before canvas is laid.

Cockpit Facing and Splash Board. Mahogany, ½ in. thick, shaped as shown. Secure face pieces through coamings into carlings with 1-in. screws, counterboring

At rest, Merry Maid floats on an even keel with the outboard in place and two passengers aboard.

LINES AND OFFSETS


BUILDING BASE LINE
DECK AT ℄
SHEER
ACTUAL PROJECTED TRANSOM (TO OUTSIDE OF PLANKING)
SHEER-22⅝"
L.L.2-23⅛"
8"
4½"
1⅝"
MOTOR CUTOUT
L.L.1-24¾"
W.L.-25¹¹⁄₁₆"
2¼"
21¼"
5¾"
PROFILE
CHINE
B
A
BASE LINE
S
0
1
2
3
4
5
6
8
C.B
3½"
27"
1¾"
1½"
⅝"
⅞"
5"
1"
8⅝"
1⅜"
3¼"
4⅝"
9"
9"
9"
27"
14½"
10⅞"
6"
8"
10"
3'-6"
L.L.2
L.L.1
W.L.
21"
SIDE-FRAME LOCATION
SHEER
L.L.2
CURVE OF AREAS
L.L.1
W.L.
CHINE
PLAN
KEEL
STEM
STEM FACING
BUTTOCK B
BUTTOCK A
8"
8"
℄

CHARACTERISTICS

LENGTH OVER ALL	15' 0"
LENGTH ON WATER LINE	13' - 6"
BEAM	5' 0"
DRAFT	7"
DISPLACEMENT	910 POUNDS
CENTER OF BUOYANCY	11" AFT OF STA 3
BLOCK COEFFICIENT	43 %
PRISMATIC COEFFICIENT	76 %
FINENESS COEFFICIENT	79 %
MOMENT TO TRIM 1"	75 FOOT-POUNDS
POUNDS PER INCH IMMERSION	244 POUNDS
AFTER-BODY DIHEDRAL	170 DEGREES
RECOMMENDED POWER	10 TO 16 H.P.
HULL WEIGHT	275 POUNDS

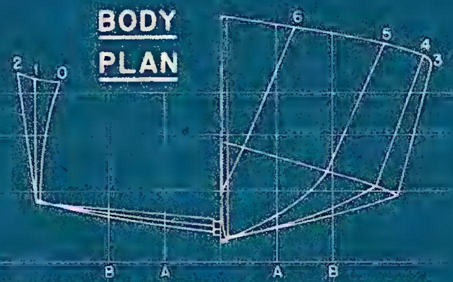
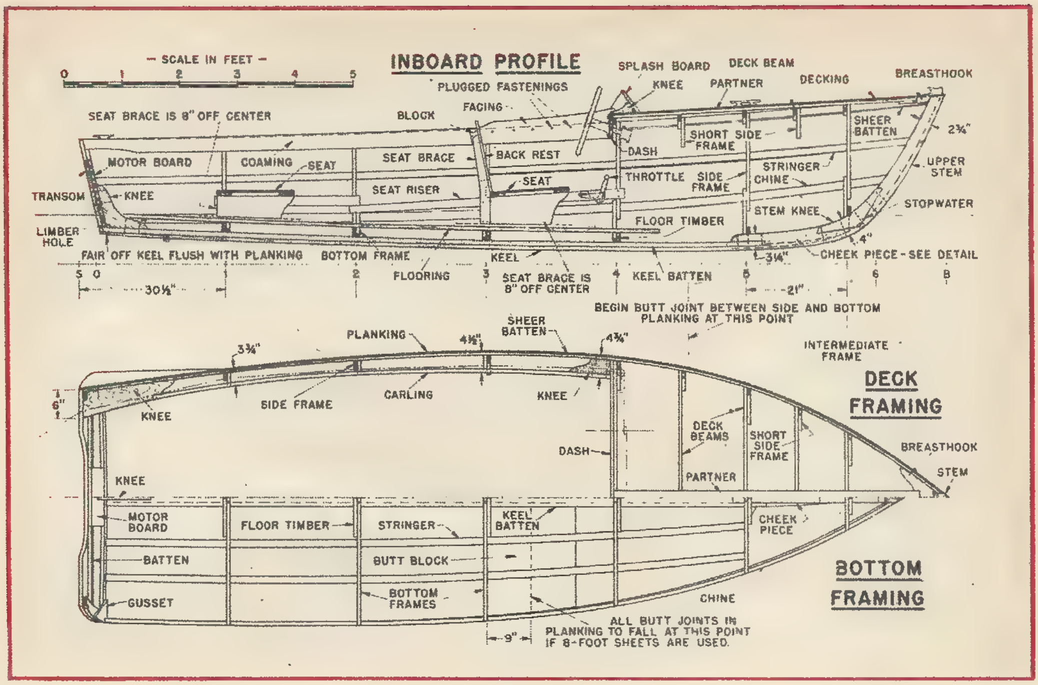

BODY PLAN
2
1
0
6
5
4
3
B
A
A
B

TABLE OF OFFSETS

DIMENSIONS GIVEN IN FEET, INCHES, AND SIXTEENTHS OF INCHES TO OUTSIDE OF PLANKING.

	STATION	0	1	2	3	4	5	6
HEIGHTS ABOVE BASE	KEEL	0-5-12	0-4-11	0-3-13	0-3-2	0-2-13	0-2-13	
	FAIRBODY	0-6-4	0-5-3	0-4-5	0-3-10	0-3-5	0-3-5	
	CHINE	0-8-7	0-8-7	0-8-11	0-9-6	0-10-12	1-0-14	1-4-4
	SHEER	2-1-11	2-2-3	2-3-0	2-4-0	2-5-6	2-7-1	2-9-6
	BUTTOCK A	0-6-14	0-5-14	0-5-2	0-4-11	0-4-15	0-6-8	
	BUTTOCK B	0-7-9	0-6-14	0-6-6	0-6-10	0-7-10		
WIDTHS FROM ℄	FAIRBODY	0-1-0	← STRAIGHT LINE →					0-1-0
	CHINE	2-1-12	2-2-6	2-2-5	2-1-4	1-10-3	1-3-5	0-3-6
	W.L.	2-1-11						
	L.L.1	2-0-15						
	L.L.2	1-11-8						
	SHEER	1-10-14	2-2-8	2-5-0	2-6-1	2-5-1	1-11-8	0-10-12



— SCALE IN FEET —
0
1
2
3
4
5
INBOARD PROFILE
SPLASH BOARD
DECK BEAM
PLUGGED FASTENINGS
KNEE
PARTNER
DECKING
BREASTHOOK
SEAT BRACE IS 8" OFF CENTER
BLOCK
FACING
SHEER BATTEN
2¾"
SHORT SIDE FRAME
MOTOR BOARD
COAMING
SEAT
SEAT BRACE
BACK REST
DASH
UPPER STEM
STRINGER
TRANSOM
KNEE
SEAT RISER
SEAT
THROTTLE
SIDE FRAME
CHINE
STOPWATER
STEM KNEE
LIMBER HOLE
FLOOR TIMBER
4"
FAIR OFF KEEL FLUSH WITH PLANKING
BOTTOM FRAME
KEEL
3¼"
CHEEK PIECE - SEE DETAIL
5 0
1
2
FLOORING
3
SEAT BRACE IS 8" OFF CENTER
4
KEEL BATTEN
5
6
B
30½"
21"
BEGIN BUTT JOINT BETWEEN SIDE AND BOTTOM PLANKING AT THIS POINT
PLANKING
4½"
SHEER BATTEN
4¾"
3¾"
INTERMEDIATE FRAME
DECK FRAMING
6"
SIDE FRAME
CARLING
KNEE
KNEE
DECK BEAMS
SHORT SIDE FRAME
DASH
BREASTHOOK
PARTNER
STEM
KNEE
MOTOR BOARD
FLOOR TIMBER
STRINGER
KEEL BATTEN
CHEEK PIECE
BATTEN
BUTT BLOCK
BOTTOM FRAMING
GUSSET
BOTTOM FRAMES
CHINE
9"
ALL BUTT JOINTS IN PLANKING TO FALL AT THIS POINT IF 8-FOOT SHEETS ARE USED.

and bunging with mahogany plugs. Slope the after ends and add blocks to provide slots for the seat backs. Support the splash board with a knee and deck battens and screw it to the ends of the face pieces.

Flooring. White pine, ¾x6 in. Fasten to frames and floor timbers with 1½-in. No. 8 screws over brass countersunk washers. Provide a removable section at the stern, as shown.

Seat Risers. White pine, ¾x2 in. Box into frames and fasten with two 1½-in. No. 10 screws at each joint.

Seats. Of ¼-in. plywood, framed up as

BILL OF MATERIALS

(Approximate Quantities Required)

Specify that all materials are to be used for boatbuilding. All plywood is to be exterior grade. All wood is to be air-dried to a maximum of 15 per cent moisture content. All hardwood is to consist of first, second, and select grades only. All softwood is to consist of A and B grades only.

Plywood

3 panels, ¼" x 4'-0" x 16'-0" or 6 panels, ¼" x 4'-0" x 8'-0"
1 panel, ½" x 18" x 3'-0"
1 panel, ¾" x 24" x 5'-0"

White Oak

2 pieces, S4S ¼" x 1", 16'-0" long
8 pieces, S4S ½" x 1½", 16'-0" long
1 piece, S4S ⅝" x 3", 6'-0" long
2 pieces, S4S ¾" x 1¼", 9'-0" long
2 pieces, S4S ¾" x 1¾", 16'-0" long
1 piece, S4S ¾" x 2", 12'-0" long
45 sq. ft., S2S ¾", random widths and lengths
1 piece, S4S 1" x 3½", 12'-0" long
1 piece, S2S 1", 8" wide, 3'-0" long
1 piece, S2S 2", 6" wide, 6'-0" long

Mahogany

1 piece, S2S ½", 6" wide, 12'-0" long
1 piece, S2S ¾", 6" wide, 6'-0" long
2 pieces, 1" half-round, 16'-0" long

White Pine

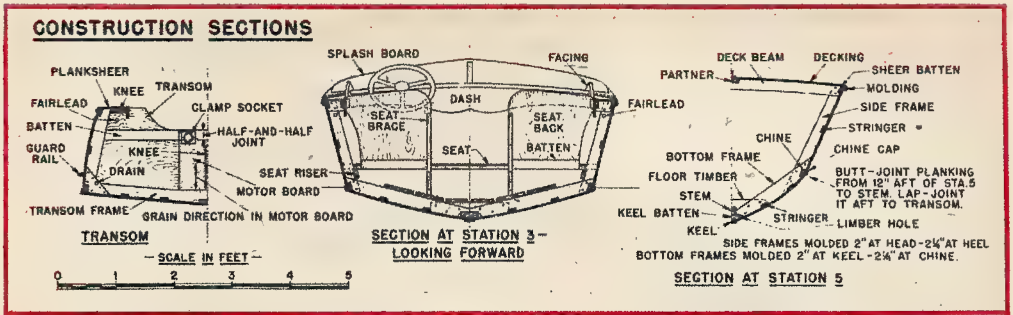
1 piece, ½" doweling, 12" long
8 pieces, S2S ¾", 6" wide, 10'-0" long

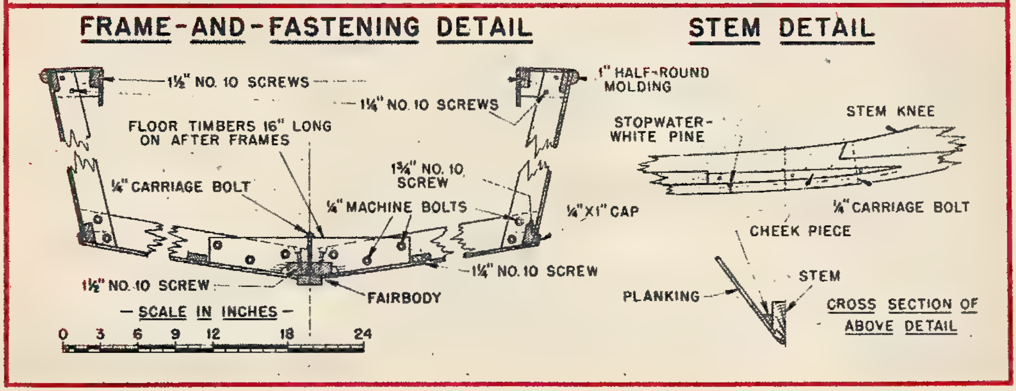
Fastenings

60 bronze or brass ¼" x 2" machine bolts
8 bronze or brass ¼" x 3" carriage bolts
8 bronze or brass ¼" x 4" carriage bolts
76 nuts for above
136 washers for above
4 gross ⅝" No. 6 flathead wood screws, brass or bronze
8 gross ¾" No. 7 flathead wood screws, brass or bronze
2 gross 1" No. 8 flathead woodscrews, brass or bronze
5 dozen 1¼" No. 8 flathead wood screws, brass or bronze
1 gross 1¼" No. 10 flathead wood screws, brass or bronze
1 gross 1½" No. 8 flathead wood screws, brass or bronze
8 dozen 1½" No. 10 flathead wood screws, brass or bronze
3 dozen 1¾" No. 10 flathead wood screws, brass or bronze
½ pound ¾" copper nails
7 dozen No. 8 countersunk brass washers

Miscellaneous

5 dozen ⅜" mahogany plugs
36 sq. ft. 8-oz. canvas
1 piece, ½" copper tubing, 24" long
1 piece, ½" brass stem band, 6'-0" long
1 quart liquid marine glue
½ pint Cascophen glue, with catalyst
½ pint Duratite putty
1 pint canvas cement
2 quarts plywood sealer, Firzite or equal
4 quarts marine paint in desired colors
2 quarts marine hard antifouling bottom paint
¼ pint boottopping paint


CONSTRUCTION SECTIONS
PLANKSHEER
KNEE
TRANSOM
FAIRLEAD
CLAMP SOCKET
BATTEN
HALF-AND-HALF JOINT
GUARD RAIL
KNEE
DRAIN
SEAT RISER
MOTOR BOARD
TRANSOM FRAME
GRAIN DIRECTION IN MOTOR BOARD
TRANSOM
SCALE IN FEET
0
1
2
3
4
5
SPLASH BOARD
FACING
DASH
SEAT BRACE
SEAT BACK
SEAT
BATTEN
SECTION AT STATION 3 - LOOKING FORWARD
DECK BEAM
DECKING
PARTNER
SHEER BATTEN
MOLDING
FAIRLEAD
SIDE FRAME
STRINGER
CHINE
CHINE CAP
BOTTOM FRAME
FLOOR TIMBER
BUTT-JOINT PLANKING FROM 12" AFT OF STA.5 TO STEM. LAP-JOINT IT AFT TO TRANSOM.
STEM
KEEL BATTEN
STRINGER
LIMBER HOLE
KEEL
SIDE FRAMES MOLDED 2" AT HEAD-2¼" AT HEEL
BOTTOM FRAMES MOLDED 2" AT KEEL-2¼" AT CHINE.
SECTION AT STATION 5


FRAME-AND-FASTENING DETAIL
1½" NO. 10 SCREWS
1¼" NO. 10 SCREWS
FLOOR TIMBERS 16" LONG ON AFTER FRAMES
¼" CARRIAGE BOLT
1¾" NO. 10 SCREW
¼" MACHINE BOLTS
¼"X1" CAP
1¼" NO. 10 SCREW
1½" NO. 10 SCREW
FAIRBODY
SCALE IN INCHES
0
3
6
9
12
18
24
STEM DETAIL
1" HALF-ROUND MOLDING
STOPWATER-WHITE PINE
STEM KNEE
¼" CARRIAGE BOLT
CHEEK PIECE
STEM
PLANKING
CROSS SECTION OF ABOVE DETAIL

shown. Fasten seats to frames with glue and copper nails. Secure to risers with 1½-in. No. 10 screws. Provide braces to flooring of ¾-in. white pine and braces to backs of ¾-in. white oak.

Seat Backs. Of ½-in. plywood.

Moldings. Mahogany 1-in. half-round. Secure to sheer with closely spaced 1-in. screws. Fit light moldings at the junctions of cockpit facings and planksheers, fastening them in place with brass escutcheon pins.

Guard Rails. White oak, ¾x1 in. Fasten with screws into frames and with screws through planking into rails. Taper forward end and bevel upper and lower sides.

Paint. Prime all plywood with one coat of plywood sealer such as Firzite. Apply two coats of marine paint to interior, a prime coat and three coats of marine paint to topsides, and three coats of hard anti-fouling marine paint to bottom.

Hardware. One No. 4 Whitkum steerer (Whitkum Co., Springfield, Mass.), one No. 9 Whitkum throttle, one ⅜-in. shoulder eye bolt, two bronze motor-clamp screw sockets, two 1½-in. swivel blocks, two housed fairlead blocks, 10 ft. of bronze Bowden wire and 28 ft. of $\frac{3}{16}$-in. bronze-center tiller rope.

Equipment. One 4½-lb. Danforth anchor, 50 ft. of ⅜-in. anchor line, 25 ft. of ¼-in. warp line, one bouyant-cushion life preserver for each passenger, and a canvas cover for the entire cockpit and motor. •

LARGE-SCALE PLANS

will greatly simplify construction. Send $2.50 to MECHANIX ILLUSTRATED Plans Service, Fawcett Building, Greenwich, Conn. Please specify Plan No. B-198.

Merry Maid is light and small enough so she can be carried to the water on a two-wheel trailer.

Under way, she trims nicely. Note that the wake is thrown well outboard so passengers stay dry.

How to Choose and Equip a Canoe

You won't get bored with a canoe's limitations if you purchase the proper one and add a few gadgets to it.

By J. A. Emmett

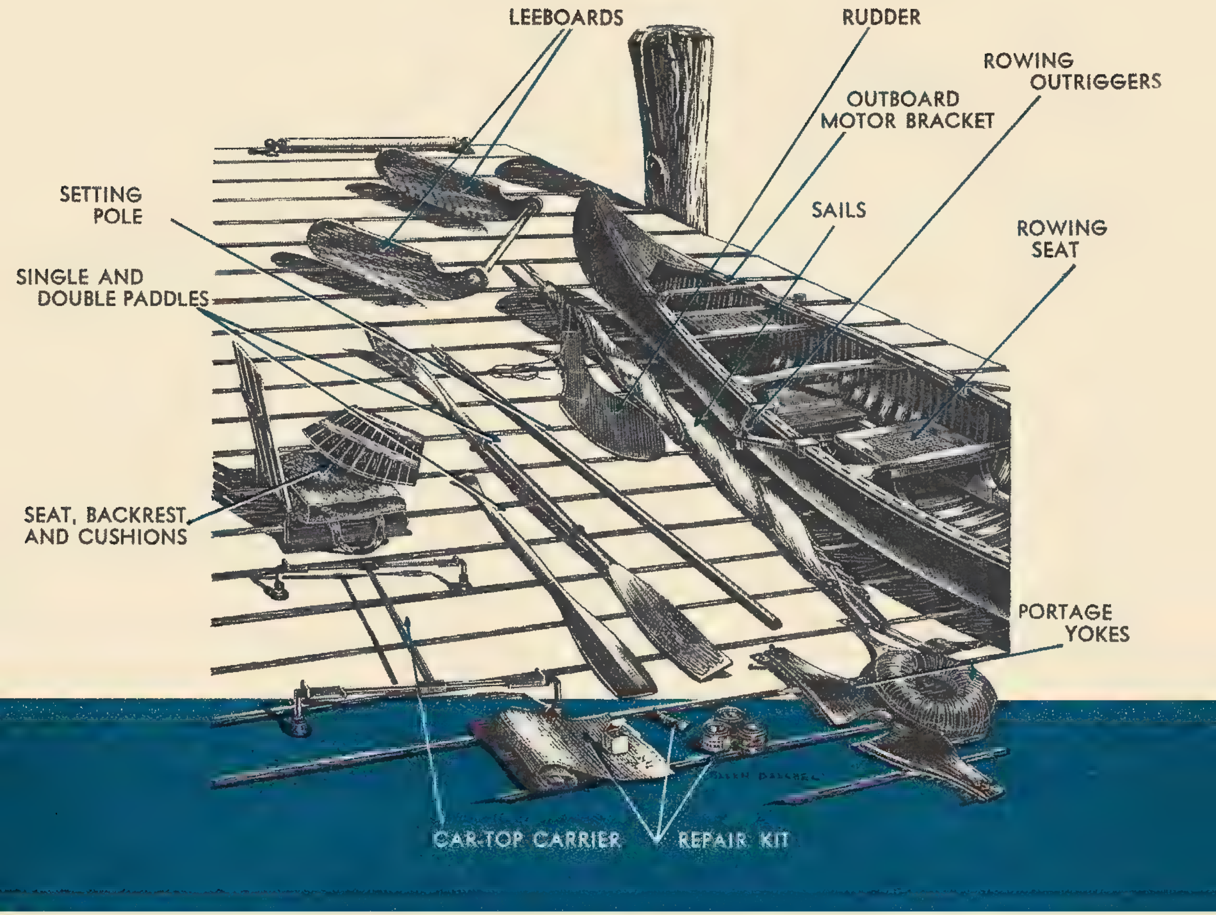
IF you are going to buy a canoe, don't blindly accept the first one that a dealer offers you. Carefully consider the size and the type of construction. Be concerned with the different built-in features that most manufacturers now supply as optionals at slight extra cost. Some of these make the canoe safer, others increase its handsomeness, and still others cause it to be easier and more comfortable to handle.

To acquaint yourself with the scope and cost of the optionals offered by the manufacturers, write for their catalogs and study them. Since the extras must be built in, you can't expect immediate delivery, but must allow the manufacturer some time—usually a month—to incorporate the changes.

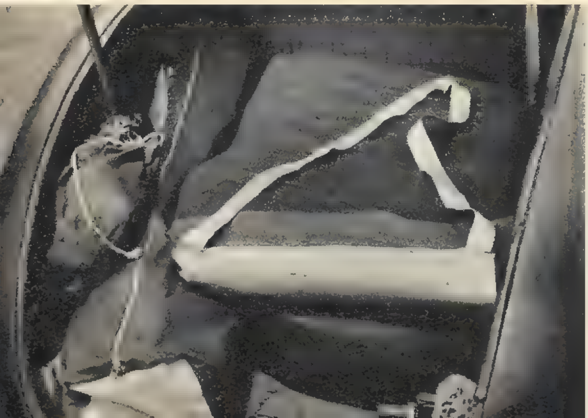
If you want sponsons or safety chambers, you'll find that the cost will be upped about $30 and the weight will be increased approximately 20 pounds. Extra ribs, either half or full length, can be installed between the regular ribs. The full-length ones greatly stiffen and strengthen the canoe. The half-length ones, which extend across the bottom but not completely up the sides, add less weight than do the full-length ones, yet still stiffen the bottom considerably.

In the standard canoe, the bow and stern decks are merely V-shaped yokes that tie the gunwales to the ends. Decks long enough to strengthen the canoe materially and keep spray out can be ordered for about $15. Some models come with a keel while others are supplied without one. You can usually have this feature omitted or added, as desired, at no difference in the price. Bilge keels (short strips parallel to but out from the main keel) can be fitted at about $8 per pair.

Other extras that are available include a towing ring through the stem near the water line, a false stem to cover and protect the canvas, and extra-heavy outer gunwales for added protection. Most manufacturers offer their most popular models in two grades. The better grade may have mahogany trim instead of spruce, planking of


LEEBOARDS
RUDDER
ROWING OUTRIGGERS
OUTBOARD MOTOR BRACKET
SETTING POLE
SAILS
ROWING SEAT
SINGLE AND DOUBLE PADDLES
SEAT, BACKREST AND CUSHIONS
PORTAGE YOKES
CAR-TOP CARRIER
REPAIR KIT

Complete camping equipment for three people can be stowed nicely in a canoe, aboard a kayak, or (bottom picture) in the trunk of an automobile.



If you'll ever have to transport the canoe and equipment overland between navigable waters, by all means invest in a couple of portage yokes.

If you enjoy sailing, convert your canoe into a sailboat by adding sails, leeboards, and rudder.

more carefully selected stock, more expensive fastenings, and superior workmanship. Where special painting or lettering is wanted, the cost will depend on the intricacy of the job.

Many owners fail to get the fullest measure of pleasure from their canoes because they are content with having the bare minimum of equipment. They don't know about the wealth of gear that can be purchased nowadays to add to canoe enjoyment or even to open up entirely new fields of use.

Paddles, which are seldom included in the price of a canoe, can be had in spruce, ash, or maple for from $3 up. You have quite a choice of lengths and blade widths and shapes. A double-bladed paddle will cost at least $8 with straight blades and a dollar or so more with spoon blades. Rubber drip cups cost 60 cents apiece. Copper tips can be added to all paddles. A spruce setting pole for shallow water, complete with metal tip, will run around $5.

If you want to use oars, special outrigger rowlocks and a rowing seat can be had. To use an outboard motor, add one of several different makes of stern brackets or mountings, which cost from $10 up.

Some of the smaller canoes have built-in carrying yokes for use when portaging. Usually, though, you must buy one. You have a choice of either a padded yoke or a carved-cedar one. Each costs about $5, but the cedar type is harder to find.

Seats with folding backs come in several models. One made of spruce slats will cost around $5. A better one with a mahogany frame and cane seat and back will come to a couple of dollars more. Spruce back rests are available at $3 each. Prices for buoyant cushions run from $3 apiece for the small, thin ones to $6 each for the larger and better made ones.

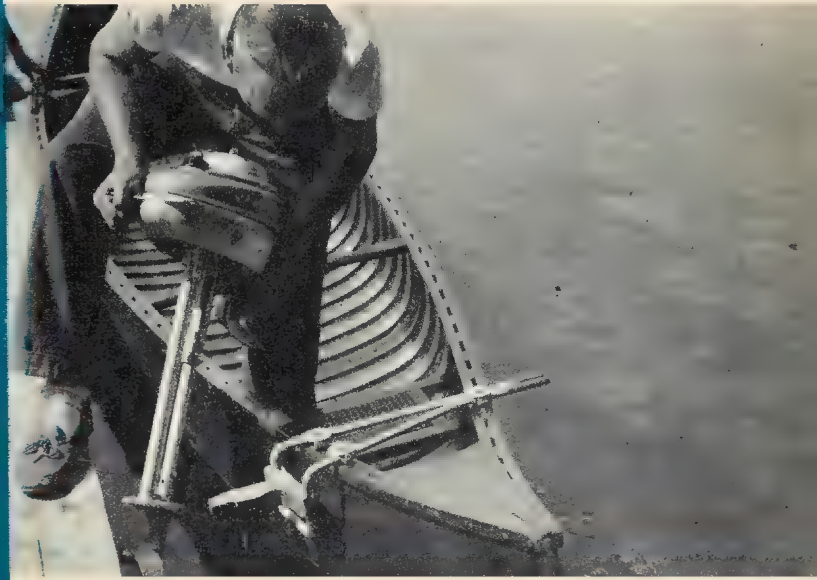
Kits to repair slight hull damage can be had at around $3 each. You can assemble your own by putting a few tacks, a couple of pieces of canvas, and small cans of paint, cement, and glue in a homemade kit bag.

A sailing rig can be bought as a complete unit or you can purchase the fittings and assemble your own outfit. A 45-sq.-ft. sail will be priced at around $20. One of 75 sq. ft. will come to about $30. The spars will run around $12; the leeboards, $12; a rudder, $10; and a cane seat with a hole for the mast, $5.

Manufacturers of camping gear offer tents, sleeping bags, cooking and eating kits, and so on, that are lightweight and compact enough to appeal to those interested in using their canoes for cruising, a branch of canoeing that is most interesting to many owners. •

In shallow, rock-filled, rough, or narrow waters, where a paddle would be a nuisance or useless, employ a setting pole.

Tired of paddling? Hook on a low-power outboard. All that's required is a mounting of the crossbar type to take the motor.



Or purchase one of the square-sterned aluminum canoes that you can get now. They are tops for use with outboard motors.

Is Central Heating Obsolete?

Of two similar homes with the same cubage, this one employing radiant heating was much more comfortable during a rugged Canadian winter. Absence of boilers and oil storage tanks resulted in 20 per cent more living space than in the conventional dwelling.

Your present heating plant may soon be keeping the dodoes warm, for new techniques are making a bid at moving furnaces out of cellars and into the museums.

By Arthur Miller

THOUGH the devices that may give central heating the nudge are new, the principle behind them is no Johnny-come-lately. It's the old idea of warming each room separately—with electricity taking over the work that was once done by coal, wood, and oil.

Electric heaters have long been used as supplementary and spot heaters. In recent years a couple of the more efficient types have been piling up statistics to show that they can take over the whole house-warming job. Cost-wise they're right in the running with oil, but they offer possibilities of economies that can't be matched by any type of furnace plant. And for con-

Radiant glass panels helped considerably in this transformation. The ugly cold water flat at left was completely overhauled into the modern apartment unit shown at right. One panel was built right into the bookcase.

venience, cleanliness, and comfort, they are in a class by themselves.

There are limitations, of course. Installed in poorly insulated houses, they'll send the electric bill zooming. But bad insulation increases any heating budget. In special cases where high uniform temperatures are required in a large number of rooms, electric heaters will also take a back seat. But for average homes in any climate they offer many advantages. Installation costs are low—roughly a third to a half as much as for a central plant—because they require no ducts, pipes, blowers, furnaces or related equipment. Service and maintainance are at a minimum.

The post-war housing shortage gave electric room heating a big boost. Many summer houses had to fill in as year round residences and required heating in a hurry. In such cases the convenience and low initial cost of plug-in, no-pipe warmers made them popular. Fuel shortages also increased their use because many people who couldn't buy oil lined up electric spares.

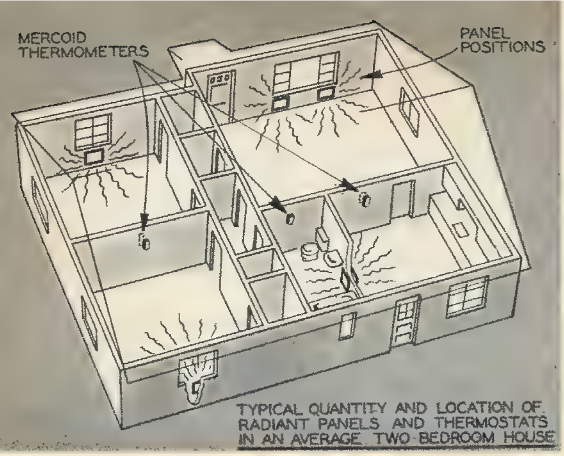
Two of the most successful types of heaters are described in this article. One, known as Utilities, made by the Home Owners Utilities Company of New York, has stayed close to tradition, at least in appearance. Each radiator comes packed with a chemical that heats up quickly and retains its heat for fairly long periods. A sensitive thermostat on every unit turns power on and off to maintain the desired temperature. Because of the thermostatic control, the radiator draws current only about 75 per cent of the time it is in operation. Otherwise it coasts along on chemical heat alone.

Utilities radiators are made in 37 sizes to suit practically every heating requirement. Common models range from 800-watt heaters for 640 cubic-foot rooms ($60) to 1,400-watt units that can keep 3,800 cubic feet comfortable ($100).

The fairly high current drain makes it desirable to use electric heaters on separately fused circuits. It would be unwise, for example, to add 1,000 or 2,000 watts of heating equipment to a circuit that is already carrying a refrigerator, radio or TV, and a couple of hundred watts of lighting. It is a good idea, especially in old houses, to have the circuits checked before installation. On the other hand a 15-20-ampere fused circuit can handle as much room heating as any Alaskan is likely to want.

However, although the Utilities radiators will supply adequate heating for small cottages they are not recommended as replace-

Left: Panel screws into the wall or partition. A flush panel is available which may be recessed into the wall. Right: Frame is polished stainless steel with aluminum reflector behind glass. Where old wiring exists it's advisable to use 12-gauge BX.


MERCOID THERMOMETERS
PANEL POSITIONS
TYPICAL QUANTITY AND LOCATION OF RADIANT PANELS AND THERMOSTATS IN AN AVERAGE TWO-BEDROOM HOUSE

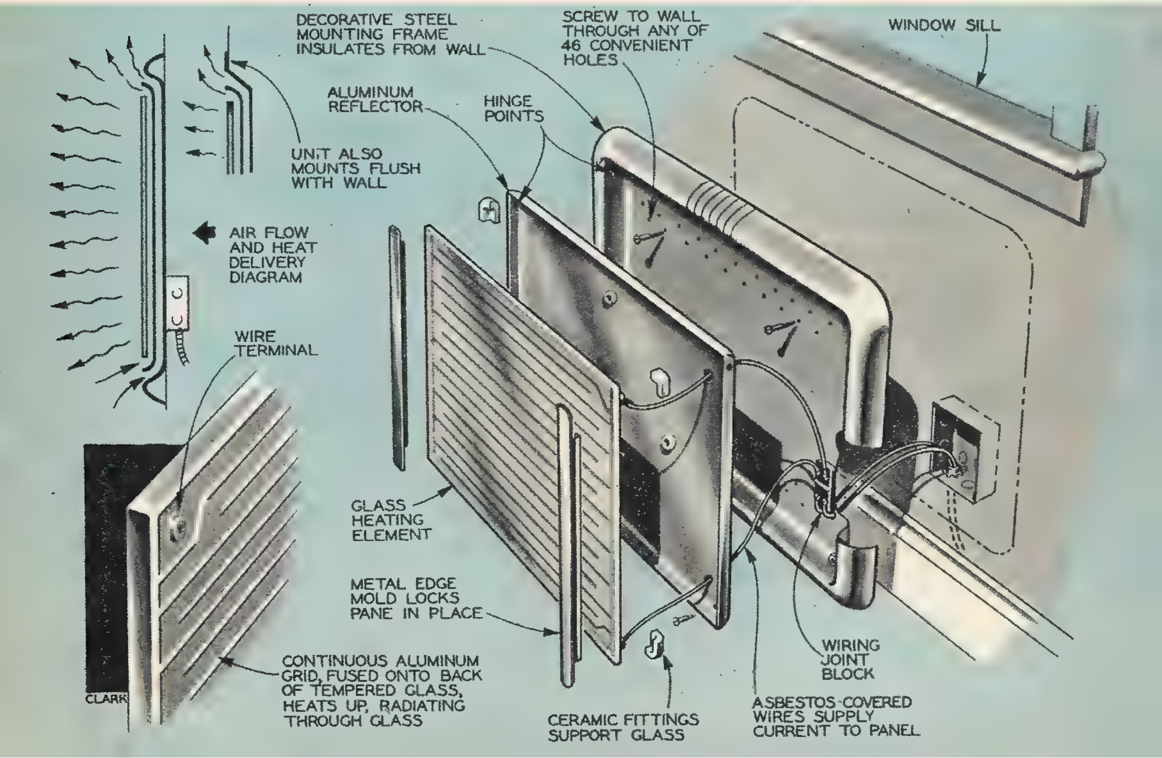
Note that thermometers are placed across the room from the heating units. Each thermometer controls only the panels in its respective room.

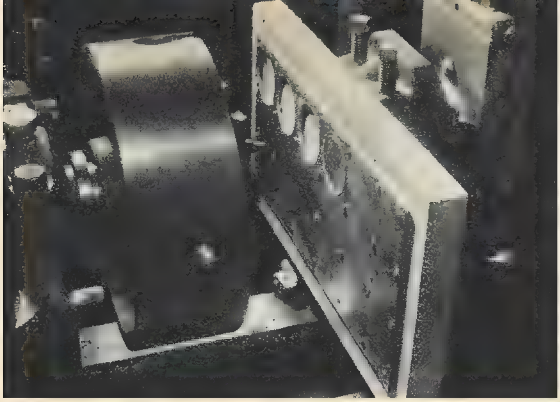
Original installation cost in a new building may eventually save as much as one half the price of conventional hot water or steam systems.

ment units for a central heating plant in larger homes. Such homes (two bedrooms and up) can use the new radiant panels for effective replacement of central heating. These units come in the form of glass panels set into frames 1½ inches thick; in most permanent installations they are recessed into walls and thus become even less conspicuous.

Glass heating panels are marketed by Continental Radiant Glass Heating Corporation, New York. Standard rooms require one 16x24-in. unit; larger rooms may need two or three. For bathrooms or other small rooms, smaller units are also available. Aluminum grids fused into tempered glass sheets do the job. Electricity heats the metal and the heat is radiated through the glass. Panels maintain a temperature of about 340° F. but the low conductivity of the glass protects you from bad burns in case of accidental contact. Furniture, drapes, and the like won't ignite either, though prolonged contact may cause charring.

Each glass sheet is backed by an aluminum reflector. Room air enters a horizontal opening below the glass and rises into the space between the glass and the reflector. When it warms [*Continued on page* 178]


DECORATIVE STEEL MOUNTING FRAME INSULATES FROM WALL
SCREW TO WALL THROUGH ANY OF 46 CONVENIENT HOLES
WINDOW SILL
ALUMINUM REFLECTOR
HINGE POINTS
UNIT ALSO MOUNTS FLUSH WITH WALL
AIR FLOW AND HEAT DELIVERY DIAGRAM
WIRE TERMINAL
GLASS HEATING ELEMENT
METAL EDGE MOLD LOCKS PANE IN PLACE
CONTINUOUS ALUMINUM GRID, FUSED ONTO BACK OF TEMPERED GLASS, HEATS UP, RADIATING THROUGH GLASS
CERAMIC FITTINGS SUPPORT GLASS
ASBESTOS-COVERED WIRES SUPPLY CURRENT TO PANEL
WIRING JOINT BLOCK
CLARK



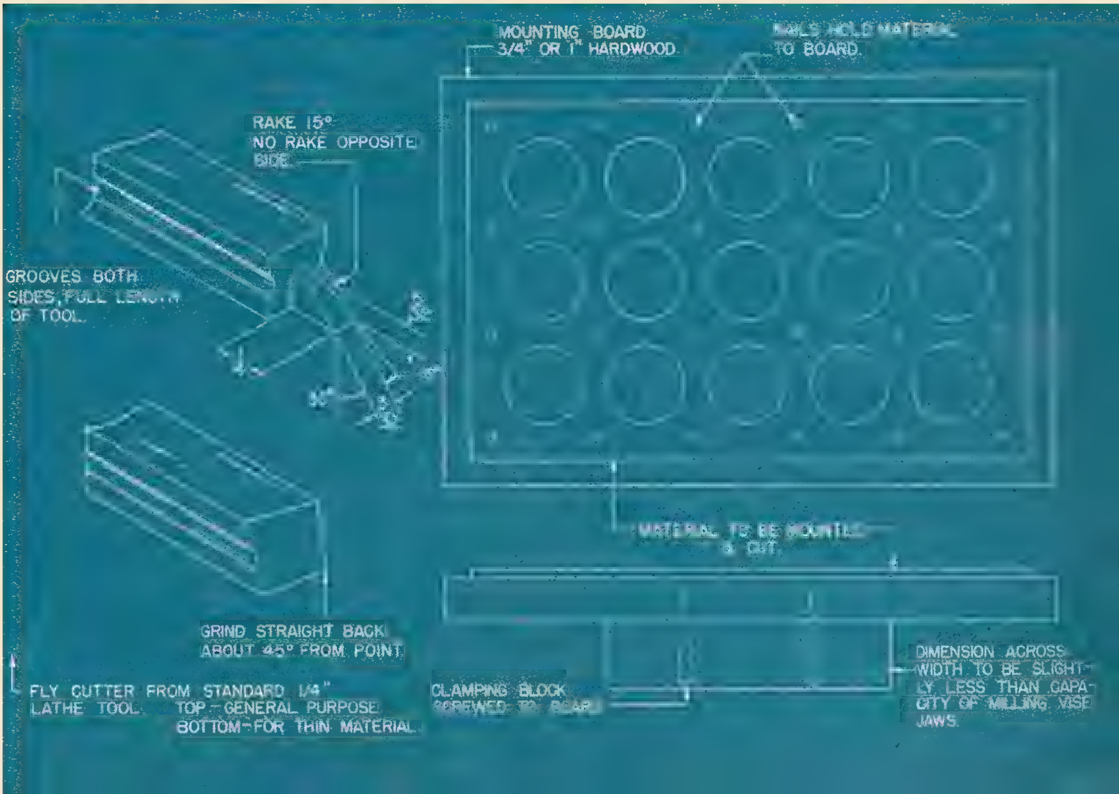
Material is nailed firmly to hardwood mounting board. Unit must be absolutely rigid in place.

Fly cutter is a specially-ground lathe tool which is held in place by two jaws of a four-jaw chuck.

precision fly cutter

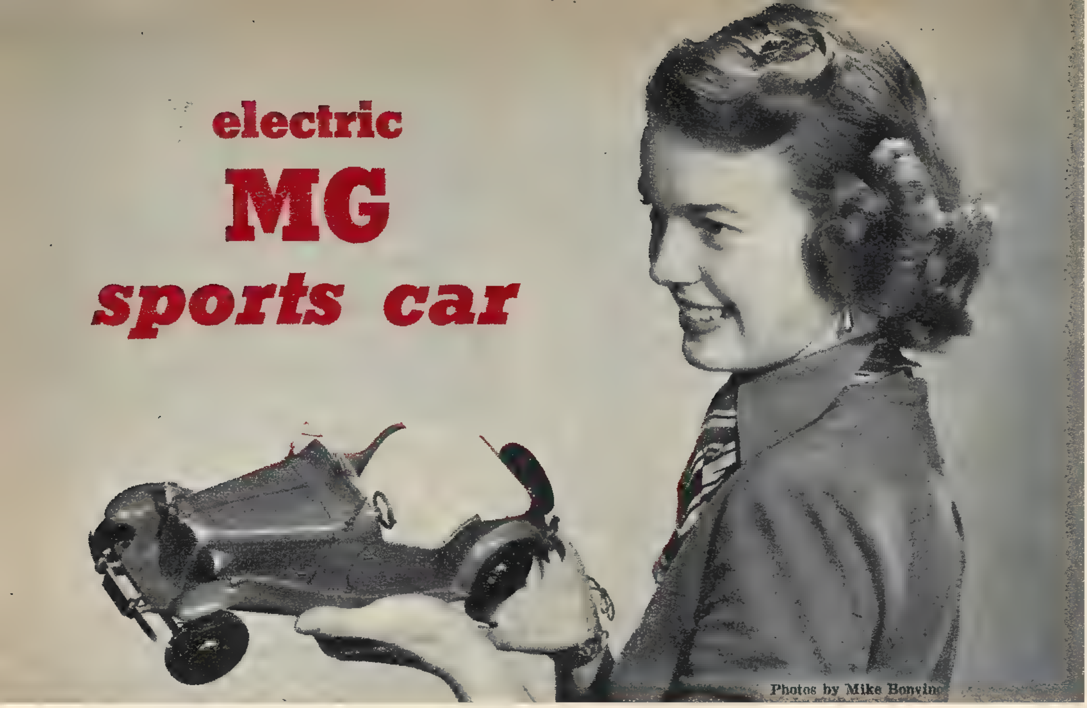
WITH the aid of this screw-cutting setup, you will be able to cut a variety of disks or to make precise holes with your lathe. It employs a hardwood mounting board with a clamping block screwed to the back. The cutter is a standard lathe tool ground to the shape indicated in the sketch below, and it will cut material up to ¼ in. thick. If thin sheet metal is to be used, the tool may be simply ground back sharply from a single point.

In actual use, the tool is held between two chuck jaws which fit into grooves made to prevent vibration. One jaw is advanced as far across the chuck center as necessary; the other is retracted. To set the tool, scribe the desired circle on the metal. Place a lathe center in the headstock and center the circle on it. Without changing the setting, run the carriage back and place the four-jaw chuck in the lathe. The cutting tool can thus be adjusted to the edge of the scribed circle. When position of your circle is unimportant, the tool can be set by making trial cuts. Several thin sheets may be cut simultaneously. If disks tend to fly too much, coat material with rubber cement before mounting.—*Will Thomas* •



MOUNTING BOARD 3/4" OR 1" HARDWOOD
NAILS HOLD MATERIAL TO BOARD.
RAKE 15° NO RAKE OPPOSITE SIDE
GROOVES BOTH SIDES, FULL LENGTH OF TOOL
MATERIAL TO BE MOUNTED & CUT
GRIND STRAIGHT BACK ABOUT 45° FROM POINT
FLY CUTTER FROM STANDARD 1/4" LATHE TOOL. TOP–GENERAL PURPOSE BOTTOM–FOR THIN MATERIAL
CLAMPING BLOCK SCREWED TO BOARD
DIMENSION ACROSS WIDTH TO BE SLIGHTLY LESS THAN CAPACITY OF MILLING VISE JAWS.

electric MG sports car



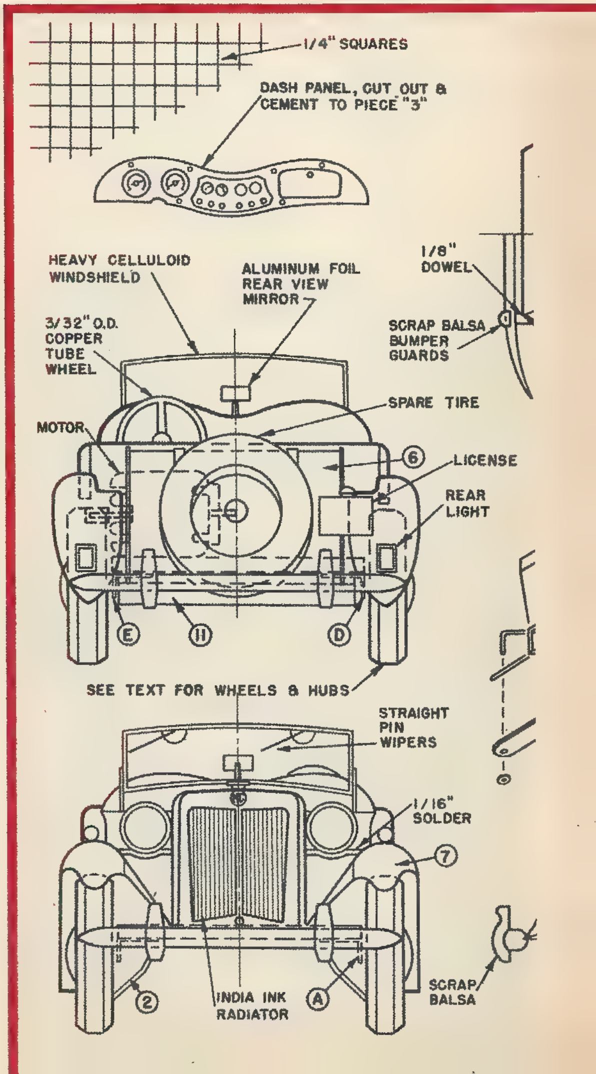
Photos by Mike Bonvino

Build a flashy 12-inch scale model of one of the most popular foreign sports cars on the road.

THE low-slung Morris Garage (or MG) sports car is one of the most popular foreign autos on our roads today. This new model, called Series TD, has been Americanized slightly over the previous models (disk wheels, curved fenders, large bumpers, and more comfortable riding). However, it has lost none of its distinction in appearance or performance. Acceleration and speed are high and it can negotiate sharp turns at high speeds with safety.

Many MG's are used for racing in Europe and America. Twin carburetors, 4 cylinder engine develops 54 bhp at 5,500 rpm. Weight of the car is 2,019 lbs. and fuel capacity is 12½ Imperial gallons, enough for about 300 miles of driving. No tank gauge is supplied. However, a light on the dash panel illuminates when fuel is down to 2½ gallons. The two main instruments on the dash panel are speedometer and tachometer. With four speeds forward and one reverse this English road hugger lives up to its slogan of "Safety—Fast."

Our model is simple to build and is also easy on the pocketbook. Powered by a



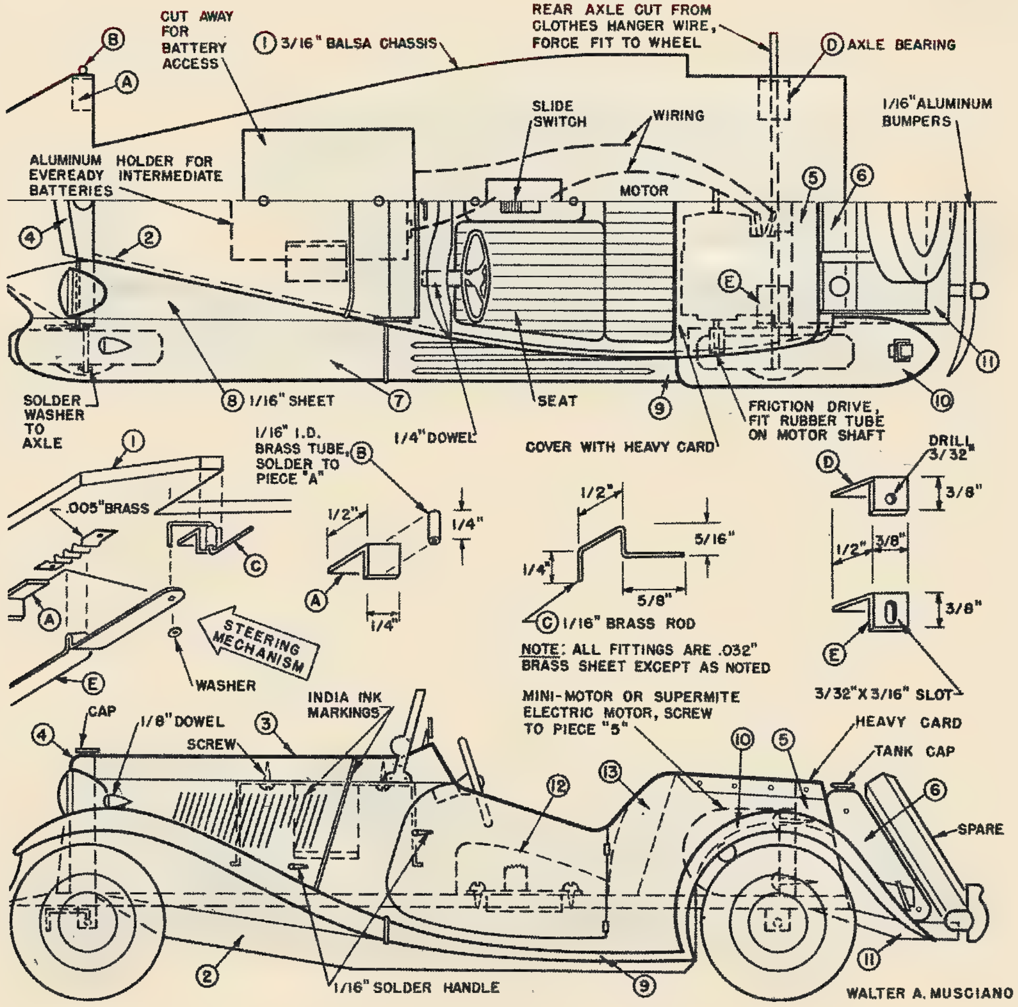
1/4" SQUARES
DASH PANEL, CUT OUT & CEMENT TO PIECE "3"
HEAVY CELLULOID WINDSHIELD
ALUMINUM FOIL REAR VIEW MIRROR
1/8" DOWEL
3/32" O.D. COPPER TUBE WHEEL
SCRAP BALSA BUMPER GUARDS
SPARE TIRE
MOTOR
6
LICENSE
REAR LIGHT
E
11
D
SEE TEXT FOR WHEELS & HUBS
STRAIGHT PIN WIPERS
1/16" SOLDER
7
2
INDIA INK RADIATOR
A
SCRAP BALSA

miniature electric motor the model can be set to travel in circles or straight away. First trace all the patterns on the correct size of balsa and cut to shape, then screw the motor to piece No. 5 and the metal battery holder to piece No. 3. When using screws on balsa it is advisable to apply a drop of cement on the balsa before using the screw and be sure to stop turning the screw the instant it is tight in order not to strip the soft wood. Cement pieces No. 4 and 6 to the chassis (No. 1). Then cement pieces No. 2 to the chassis holding them in place with straight pins until dry. Piece No. 3 is added now.

All the fittings should be cut at this time. It should be noted that the rear axle bearings are not identical in that the driving wheel axle bearing is slotted to insure positive contact between the wheel and drive shaft. Solder the brass or copper tubing (piece B) to piece A, then bend piece C from brass rod. Music wire can be substituted for this item. Cement pieces A, D and E to the chassis and add the positioner of .005-in. brass sheet. Bend the tie-rod (piece E) and drill holes at the proper location to fit the piece C. Solder washers to the piece C to hold the piece E in place. Add the rear axle (cut from wire clothes hanger) and add the wheels. We used 2-in. Veco semi-pneumatic rubber tired wheels on our model. These wheels are a bit heavy, but they are very realistic and will save a lot of work. Of course if you have access to a lathe, the wheels can be turned from pine or birch. The rear wheels are forced onto the axle while the front wheels should spin freely. Washers soldered to the axles hold the front wheels in place.

Add the slide switch in place and solder the wiring circuit in place as the plans indicate. Test the drive mechanism and steering mechanism now. Sand the model till smooth.

The fender pieces 7, 9 and 10 are carefully cut from ¾-in. medium balsa using



CUT AWAY FOR BATTERY ACCESS
① 3/16" BALSA CHASSIS
REAR AXLE CUT FROM CLOTHES HANGER WIRE, FORCE FIT TO WHEEL
Ⓓ AXLE BEARING
Ⓑ
Ⓐ
SLIDE SWITCH
WIRING
1/16" ALUMINUM BUMPERS
ALUMINUM HOLDER FOR EVEREADY INTERMEDIATE BATTERIES
MOTOR
⑤
⑥
④
②
Ⓔ
⑪
SOLDER WASHER TO AXLE
⑧ 1/16" SHEET
⑦
SEAT
⑨
COVER WITH HEAVY CARD
FRICTION DRIVE, FIT RUBBER TUBE ON MOTOR SHAFT
⑩
①
1/16" I.D. BRASS TUBE, SOLDER TO PIECE "A"
Ⓑ
1/4" DOWEL
.005" BRASS
Ⓒ
1/2"
1/4"
Ⓐ
1/4"
Ⓐ
Ⓔ
STEERING MECHANISM
WASHER
1/2"
5/16"
1/4"
5/8"
Ⓒ 1/16" BRASS ROD
NOTE: ALL FITTINGS ARE .032" BRASS SHEET EXCEPT AS NOTED
Ⓓ
DRILL 3/32"
3/8"
1/2"
3/8"
3/8"
Ⓔ
3/32" X 3/16" SLOT
CAP
④
1/8" DOWEL
SCREW
③
INDIA INK MARKINGS
MINI-MOTOR OR SUPERMITE ELECTRIC MOTOR, SCREW TO PIECE "5"
⑬
⑫
⑩
⑤
HEAVY CARD
TANK CAP
⑥
SPARE
②
1/16" SOLDER HANDLE
⑨
⑪
WALTER A. MUSCIANO

a fine coping saw. Bevel the inside edge about 45 degrees to fit the fender fairings (piece No. 8). Cut the fenders to fit the body curves and cement in place. When dry add the $\frac{1}{16}$ in. fender fairings and carve the fenders to shape, using a very sharp razor blade. Sand carefully and apply three coats of wood filler, sanding well between each coat. Cover motor space with heavy cardboard.

Cement the pieces No. 6 together to form the gas tank. Sand smooth and cement bond paper strips around the tank.

The prototype model was painted bright red with beige upholstery, dash panel and convertible top storage cover. Other MG color schemes are: black car with red, green or beige trim—forest green with beige trim—ivory with red or green trim—blue with beige trim. We used Testor's airplane dope. Four coats should produce a fine finish.

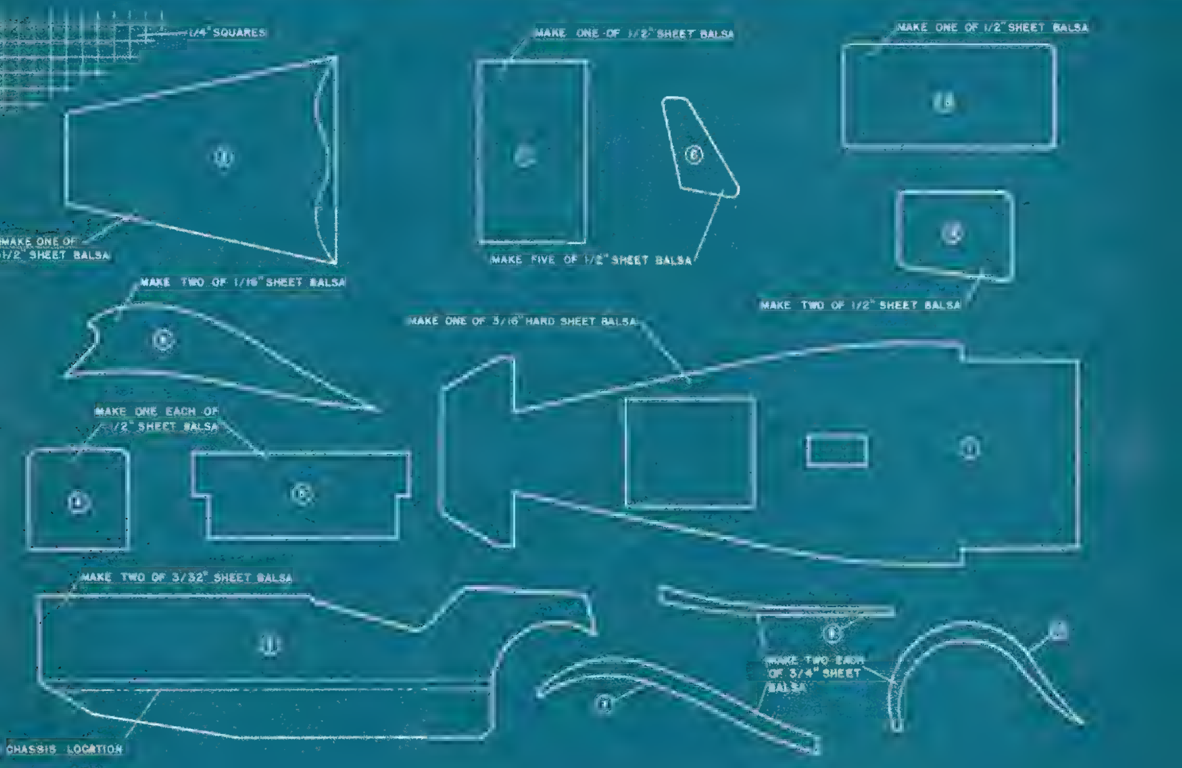
Cut bumpers from aluminum and smooth with file and emery cloth. Use ⅛-in. dowel to hold the bumpers to the car. Add the fuel tank and spare tire. Install seats. Bend the steering wheel from $\frac{3}{32}$-in. copper tubing. This is soldered to brass spokes and this assembly is attached to the dowel steering column. Installation of lights, windshield, license plates completes the assembly.

Don't forget that the lighter the model the faster it will travel. Use four or six pen cells in series. •

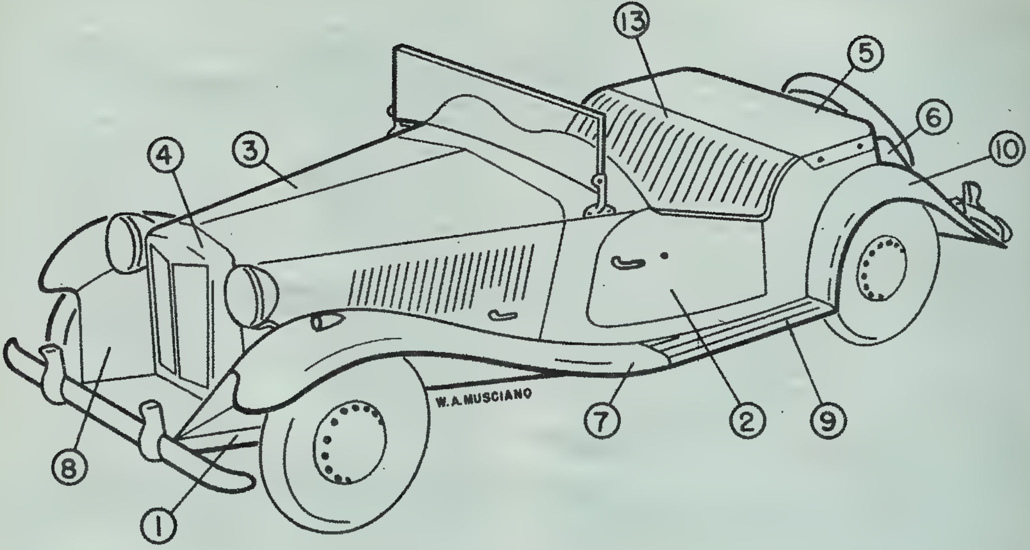
Battery-powered, the sporty MG model zips along at a snappy pace. The dashboard data is inked in.

FULL-SIZE PLANS

of this model can be obtained by sending 50c to MECHANIX ILLUSTRATED Plans Service, Fawcett Building, Greenwich, Connecticut. Please specify Plan No. 423.

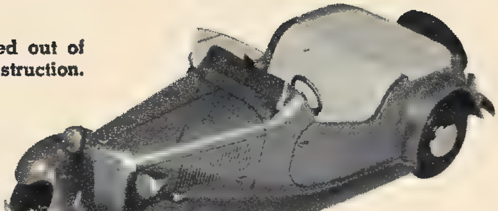


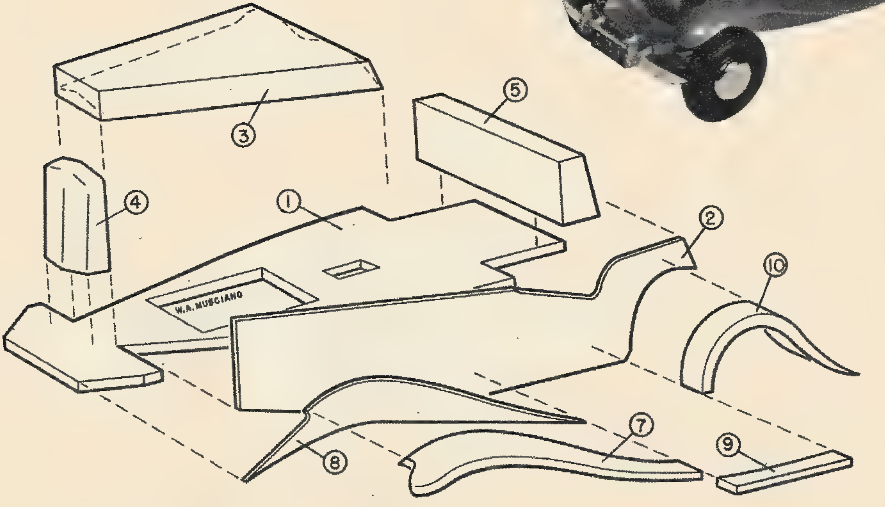
1/4" SQUARES
MAKE ONE OF 1/2" SHEET BALSA
MAKE ONE OF 1/2" SHEET BALSA
6
MAKE FIVE OF 1/2" SHEET BALSA
MAKE ONE OF 1/2" SHEET BALSA
MAKE TWO OF 1/2" SHEET BALSA
MAKE TWO OF 1/16" SHEET BALSA
MAKE ONE OF 3/16" HARD SHEET BALSA
MAKE ONE EACH OF 1/2" SHEET BALSA
MAKE TWO OF 3/32" SHEET BALSA
MAKE TWO EACH OF 3/4" SHEET BALSA
CHASSIS LOCATION


13
5
6
10
4
3
W. A. MUSCIANO
8
1
7
2
9

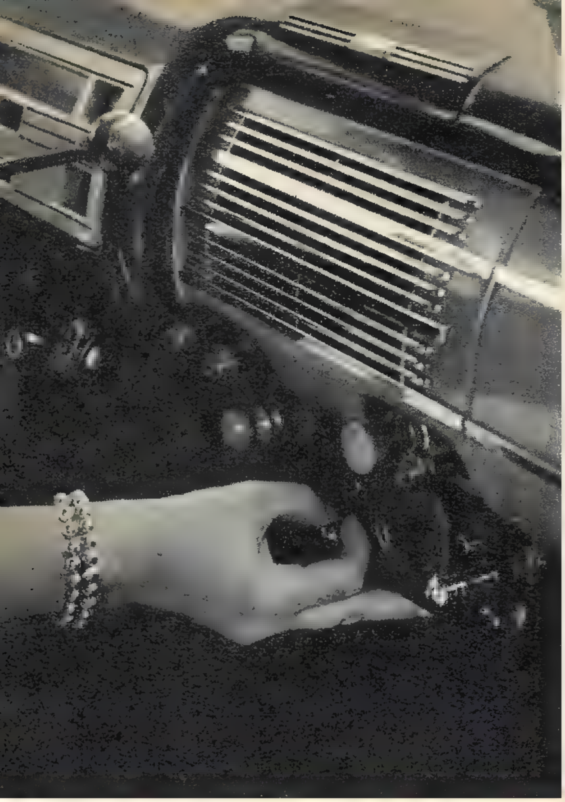
COMPLETED MODEL

You will be able to get even more speed out of this baby if you lighten in during construction.




3
5
4
1
2
10
W. A. MUSCIANO
7
9
8

BASIC ASSEMBLY



Auto Radio Doubles As Portable

AUTO radios are fine traveling companions, as far as they go. But they don't always go far enough. It's when you stop for the night at a tourist court or hotel that a radio would be most welcome, but yours is parked in the driveway instead of in your room.

If you'd like a radio that really travels with you—in a house as well as in a car—here's the set for you. It's a receiver that works on 6 volts DC or 115 AC. You can build one just like the job shown in the photos above and it will cost you less than if you bought either type alone. You'd have to buy them separately, in fact, since there are no similar combinations on the market. Some of the cheaper car sets may seem to rival it in price, but this souped-up four-tube circuit has power and sensitivity to burn—two things you rarely find in bargains.

All parts of this dual radio are squeezed into a 6 x 7 x 12-in. steel box. That's to keep it portable and makes it easy to slip in or out of your car. Depending on your car and the uses you plan for the set, you may want to assemble it differently. You could, for example, mount the speaker in a separate cabinet. Or you might want to mount the vibrator power supply permanently in the car while leaving the rest of the receiver portable. If you should want either the car or the house radio—but not both—you could eliminate the unwanted power components.

The vibrator power supply—essential to all auto radios—usually represents one of the major items of cost. The Mallory Vibrapack (type VP-540) used here generally sells for a little over $17. You may, however, be able to pick up a good second-hand unit for a lot less. Other alternatives are to assemble the whole power pack from scratch, or to purchase an unfiltered vibrator and add a couple of condensers and coils. The values of L5, C15, C17, C18, and C19—all standard items—are given in the parts list. In addition to these you'll need a couple of hash chokes, L6 and L7, which you can easily make yourself. For each choke, wind 20 turns of No. 12 enameled wire on a short piece of ½-in. plastic tubing. To keep the tubing short, wind the turns in two layers.

Base connections given in the diagram are for a 7-prong vibrator. Some of the newer types (notably the Mallory 725-C) have only 5 pins. The connections, however, remain essentially the same. Just ignore the wiring that goes to pins 6 and 7 and hook up the other 5 prongs as shown.

Though the vibrator may seem expensive, it is worth noting that this power pack is self-rectifying. That is, you don't have to use a rectifier tube to furnish the direct current needed by the other tubes.

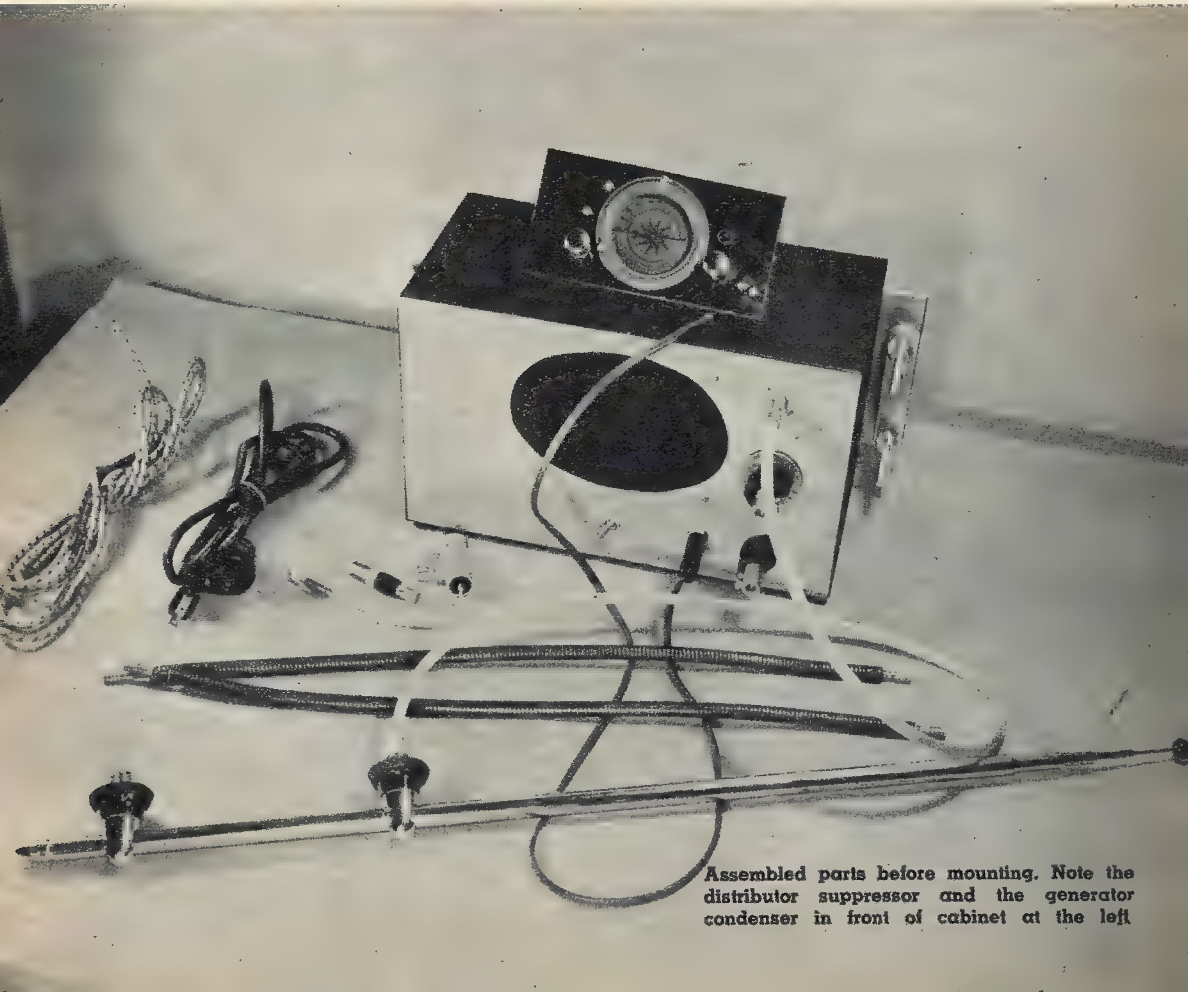
If you assemble your own vibrator unit, mount all the parts shown inside the dotted line in a small metal box. Make sure that the metal can of the vibrator is grounded both to the box and the receiver chassis.

The permeability tuner used in this set does the double job of saving space and increasing sensitivity. The one used is made by Aladdin Radio Industries, Inc., of Chicago, but similar—and suitable—types are made by several other companies. Permeability tuning isn't essential. You can, if you prefer, use a standard two-gang tuning condenser and iron-core antenna and oscillator coils. If you do, eliminate C2, C20, R2, and R15, and connect the antenna to the primary winding of the antenna coil in the conventional manner.

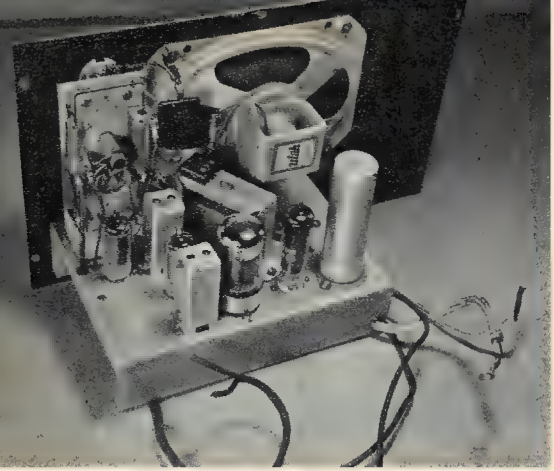
Chassis and assembly are fairly standard. All the receiver parts are mounted on a 1½ x 5 x 7½-in. aluminum chassis. Three of the tubes require 7 pin miniature sockets and one (the 7R7) takes an 8-pin lock-in socket. For the miniatures it is advisable to use ceramic rather than wafer sockets.

To help dissipate the heat put out by the 6AQ5 power tube, drill or punch a couple of large ventilating holes in the back of the steel cabinet. Use the back panel to mount the parts needed for 115-volt operation. These are a selenium rectifier and combination isolation and step-up transformer. Without the isolation transformer the entire chassis and cabinet would be "hot" and unsafe for use on AC current. A third item, SW1, is shown in the 115-volt circuit but is not mounted on the panel with the other components. This switch is half of the DPST unit that clips on to the back of the volume control; the other half of this switch controls the 6-volt power.

The tone control is built in two parts. One condenser, C22, is permanently in the circuit to reduce some of the hash and motor noise that may creep in, either from

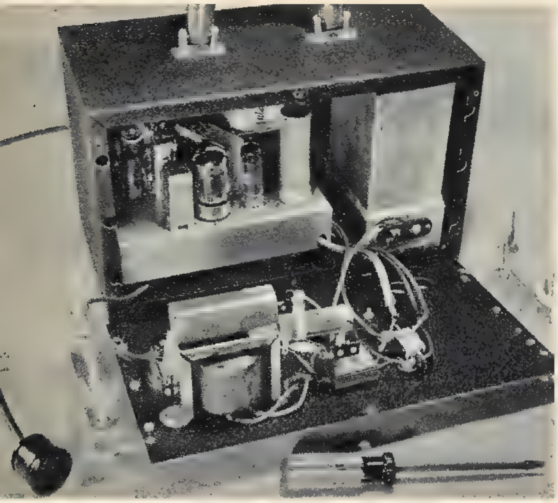


Assembled parts before mounting. Note the distributor suppressor and the generator condenser in front of cabinet at the left

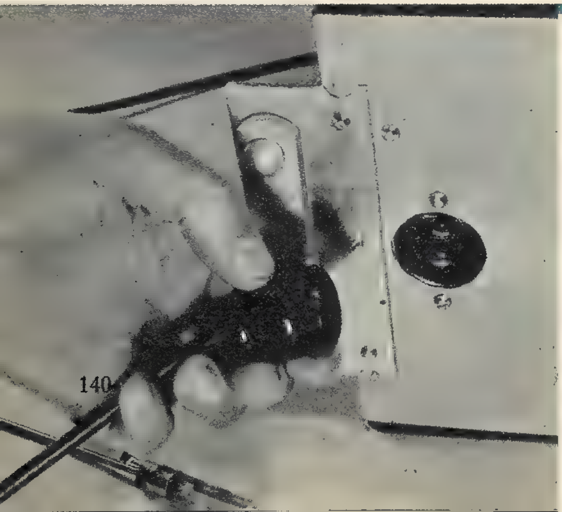


Of the four tubes used, three are 7-pin miniatures and one (the 7R7) is a Loktal tube. The vibrator housing unit fits to right of speaker as shown above.

Parts for 115-volt AC power supply are mounted on back steel panel. Power transformer can be seen inside the cabinet anchored to the base.



Male socket for 115-volt power line is recessed, and thus prevents live contacts even if power cord is plugged into line before insertion in the cabinet.

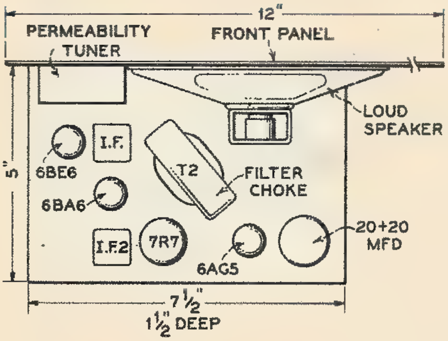


the vibrator or car engine. If any additional high-frequency cut-off is desired, all you have to do is close switch SW3 which puts an additional condenser in parallel with the first and thus clips the high-frequency range a little more.

The tuning head, which extends the controls from the metal box to a convenient spot on the dashboard or steering wheel, can be either purchased or assembled from scrap parts. The one you see is a shop-made job consisting chiefly of an old two-inch dial and a 1/4 x 3 1/4 x 6 1/4-in. plastic facing. Dials are connected to the set controls by flexible cable and a couple of brass couplings. To use this type of coupling, you have to leave the shafts on the controls long, and drill holes in the knobs. Details of the assembly are shown in a sketch. Juice for the two six-volt pilot lamps is obtained from any one of the tube heaters. Make the connection to the set through a microphone jack and plug so that the lead can easily be disconnected when you want to remove the radio for house current use.

Filtering the hash. One way to help keep vibrator noise out of the set is by enclosing all vibrator parts in a metal box as suggested above. Keep the box as far as possible from the RF section of the receiver, and use the shielded wire to connect the vibrator supply to A-plus in the set.

Motor noise is another problem. To minimize this, buy a distributor resistor and generator condenser (standard radio supply house items) and connect them to the car in the following manner. The distributor suppressor comes with plug tips for easy installation. Remove the rubber lead that goes to the distributor rotor and slip in the resistor in its place. Then replace the lead in the socket end of the resistor. The generator condenser has one flexible lead and one spade lug which is grounded to the condenser shell. Attach the lug under any grounding screw on the generator and wire the flexible lead to the hot side of the generator.—*Arthur Miller* •

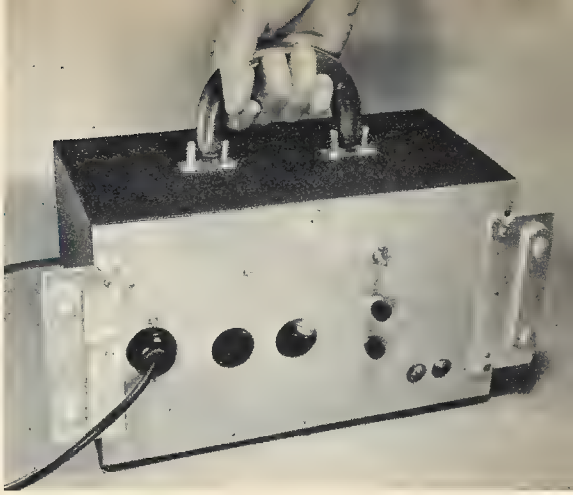


PARTS LIST

L1, L2—Permeability Tuner	Aladdin
L3, L4—Iron-core IF transformers, 455kc, type SM-107	Stanwyck
L5—RF hash choke, 7.5 mh	I.C.A.
L6, L7—Hash Chokes (see text)	
T1—Output transformer, universal, 6 watt, type 38A	U.T.C.
T2—Filter Choke, (2.5 hys, 130 Ma, 100 ohms) C-2303	Stancor
T3—Vibrator transformer, type P-4362	Stancor
T4—Power transformer, 120v at 75ma, 6.3v at 1.5 amps (type T-22R12)	Thordarson
V1—Vibrator—(type 725-C) (type 525 used in original unit.)	Mallory
S—Selenium rectifier, 100 ma	Federal
LS—Speaker, permanent magnet, oval 6-inch, vc 4 ohm	Utah
BC—Bias cell 1.25 volts	Mallory
SW1—Volume control switch, D.P.S.T.	Clarostat
SW2—Toggle switch (6v-115v) D.P.D.T.	Cutler-Hammer
SW3—Toggle switch (tone) S.P.S.T.	Cutler-Hammer
Metal Cabinet, steel, size 7x by 12x by 6 in.	Bud
Chassis, steel, size 7½x by 5x by 1½ in.	Bud
Set of tubes (6BE6, 6BA6, 7R7, 6AQ5)	RCA
Set of tube sockets (see text)	Cinch
Resistor (for car distributor)	(see text)
Condenser (for car generator) .5 mfd	(see text)
J—Single circuit jack	Mallory
C1,C12—Paper condensers .01 mfd 400 volts	Sprague
C2—Mica condenser .002 mfd 500 volts	Aerovox
C3,C7,C10—Ceramic condensers, .0001 mfd 500 volts	Erie
C4,C5,C9—Paper condensers, .05 mfd 400 volts	Sprague
C6,C15—Paper condensers, .1 mfd 400 volts	Sprague
C8—Ceramic condenser, .00005 mfd, 500 volts	Erie
C11—Electrolytic condenser, 10 mfd 25 volts	C-D
C13,C14—Electrolytic condensers, 20 mfd 450 volts	C-D
C16—Oil impregnated condenser, .005 mfd 1600 volts	Sprague
C17,C22—Paper condensers, .005 mfd 400 volts	Sprague
C18—Paper condenser, .5 mfd 200 volts	Sprague
C19—Mica condenser, .0002 mfd 200 volts	Aerovox
C20—Mica condenser, .0025 mfd	Aerovox
C21—Electrolytic condenser, 10 mfd, 450 volts	C-D
C23—Paper condenser, .02 mfd, 400 volts	Sprague

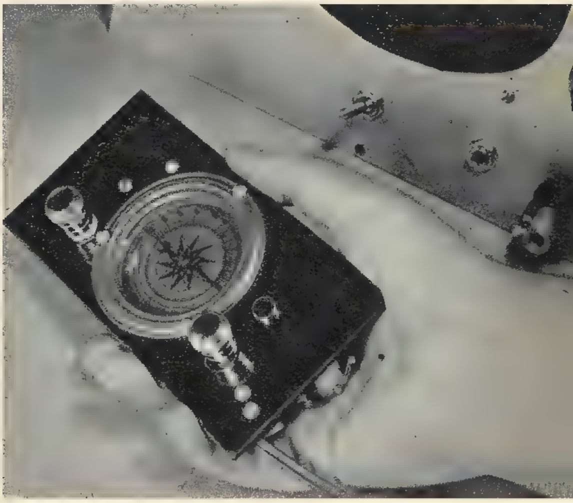
RESISTORS

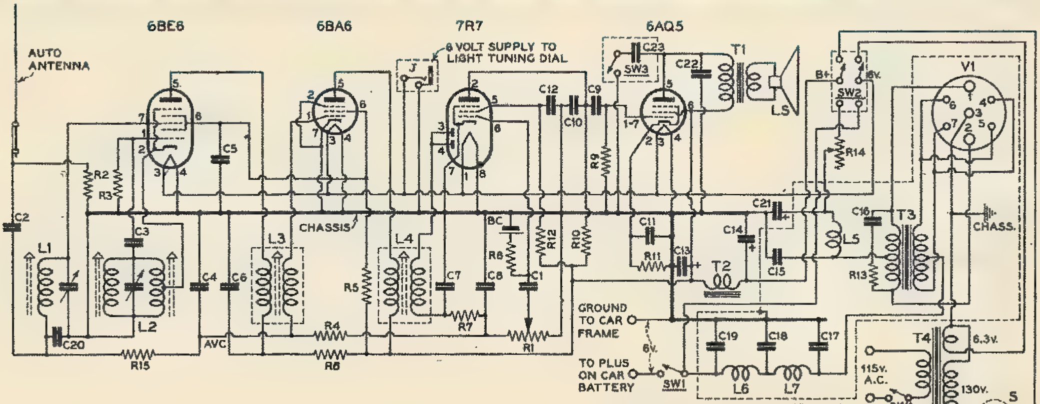
R1—Volume control, ½ megohm	Clarostat
R2—1200 ohm ½ watt	
R3—27,000 ohm ½ watt	
R4—2.2 megohm ½ watt	
R5—8,200 ohm 1 watt	
R6—1,200 ohm 1 watt	
R7—56,000 ohm ½ watt	
R8—5 megohm ½ watt	
R9—470,000 ohm ½ watt	
R10—330,000 ohm 1 watt	
R11—330 ohm 1 watt	
R12,R15—1 megohm ½ watt	
R13—5,000 ohm 1 watt	
R14—3,000 ohm (wire wound with sliding tap, 25 watt)	



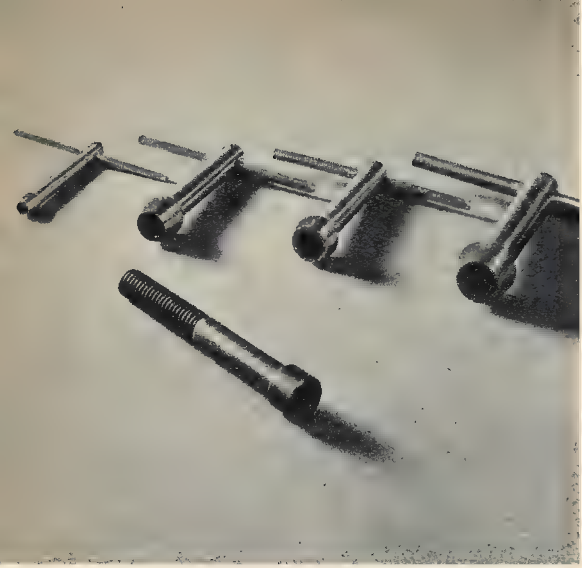
Toggle switch changes current for operation on either 6 or 115 volts. Directly below switch are positive and negative terminals to the car battery. If the cabinet is mounted to your car frame, one of these connections will no longer be necessary.

You can save money by building your tuning head. This one employs two 6-volt pilot lamps, and the line cord is plugged into a mike jack on front cabinet panel, getting current from across any of the tube heaters. One side of jack is grounded.

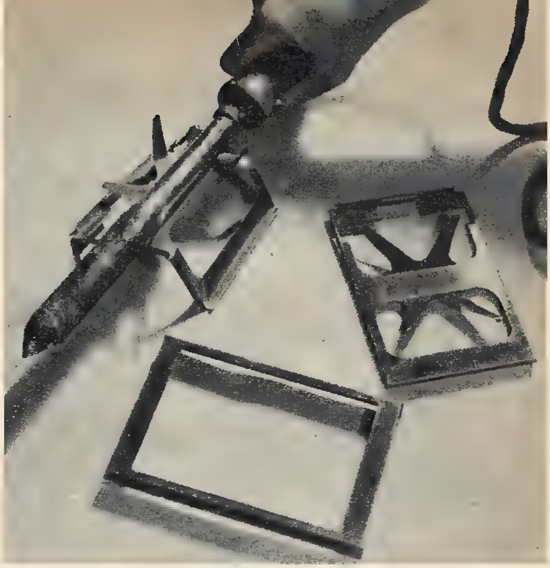



6BE6
6BA6
7R7
6AQ5
AUTO ANTENNA
6 VOLT SUPPLY TO LIGHT TUNING DIAL
J
C2
L1
C20
R15
R2
R3
C3
L2
C5
C4
C6
AVC
CHASSIS
L3
R4
R6
R5
L4
C7
C8
R7
BC
R8
C1
R1
R12
R10
C12
C10
C9
R9
SW3
C23
C22
T1
LS
1-7
C11
R11
C13
T2
C14
C21
C15
GROUND TO CAR FRAME
6V.
TO PLUS ON CAR BATTERY
SW1
C19
C18
C17
L6
L7
B+
6V.
SW2
R14
L5
C16
T3
R13
V1
CHASS.
T4
6.3V.
115V. A.C.
SW1
130V.
S

NOTE:- ALL PARTS WITHIN DOTTED LINES ARE ASSEMBLED INSIDE A SMALL METAL BOX.



Allen head bolts can easily be turned into socket wrenches. Remove the threaded section and drill the remaining shank end to take a cold-rolled steel handle of suitable diameter. Taper the heads as shown above.

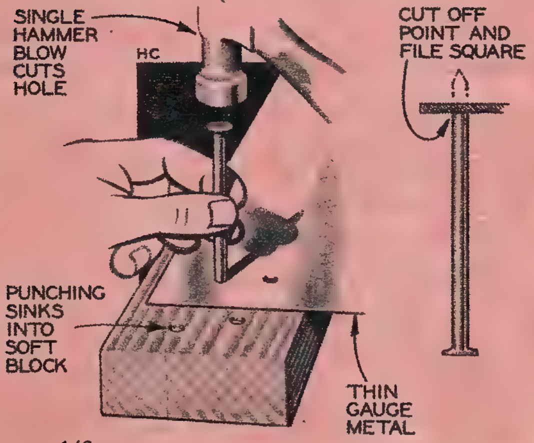


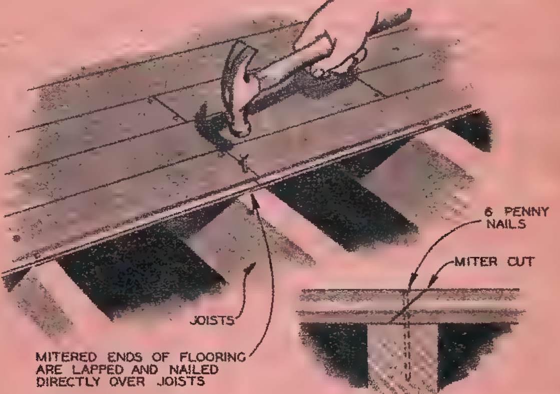
You can avoid scorched bench tops and fire hazards by using the pressure plate from an old film pack as a soldering iron stand. Bend the rim to form legs. The spring itself will keep your iron in position.

Craftsman's

By grinding off the business end of a spike, you'll have a fine punch for use on thin-gauge sheet metal. One sharp hammer blow will leave a neat disk embedded in the wood scrap on which you rest the work.

A mitered joint will prove stronger than an ordinary butt joint when used on flooring. In this manner the lumber will rest on a solid support. A dab of glue in addition to the nails will increase rigidity.


SINGLE HAMMER BLOW CUTS HOLE
HC
CUT OFF POINT AND FILE SQUARE
PUNCHING SINKS INTO SOFT BLOCK
THIN GAUGE METAL


6 PENNY NAILS
MITER CUT
JOISTS
MITERED ENDS OF FLOORING ARE LAPPED AND NAILED DIRECTLY OVER JOISTS

ARLINGTO
HOUSEHO
PAIN
DARK BROWN

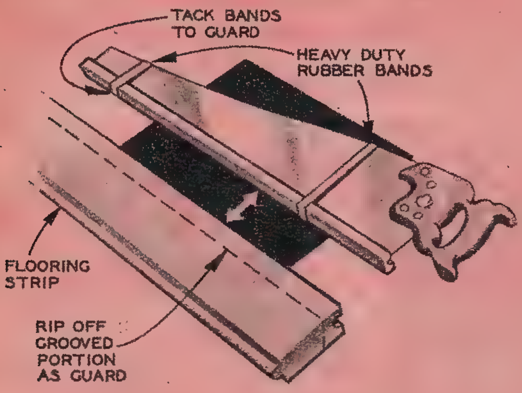
Spatter stopper. You can detour the spraying that occurs when you close a can of paint by merely spreading a rag over the can. A few gentle hammer taps will close the container lid tightly—and cleanly.

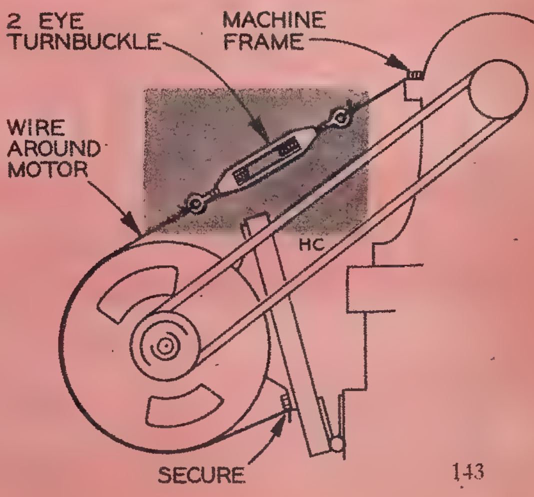
Going straight. A nail that has bent while being driven has the tendency to bend again at the same point if you try to reuse it. By gripping the weak section with pliers you can drive the nail correctly.

Corner

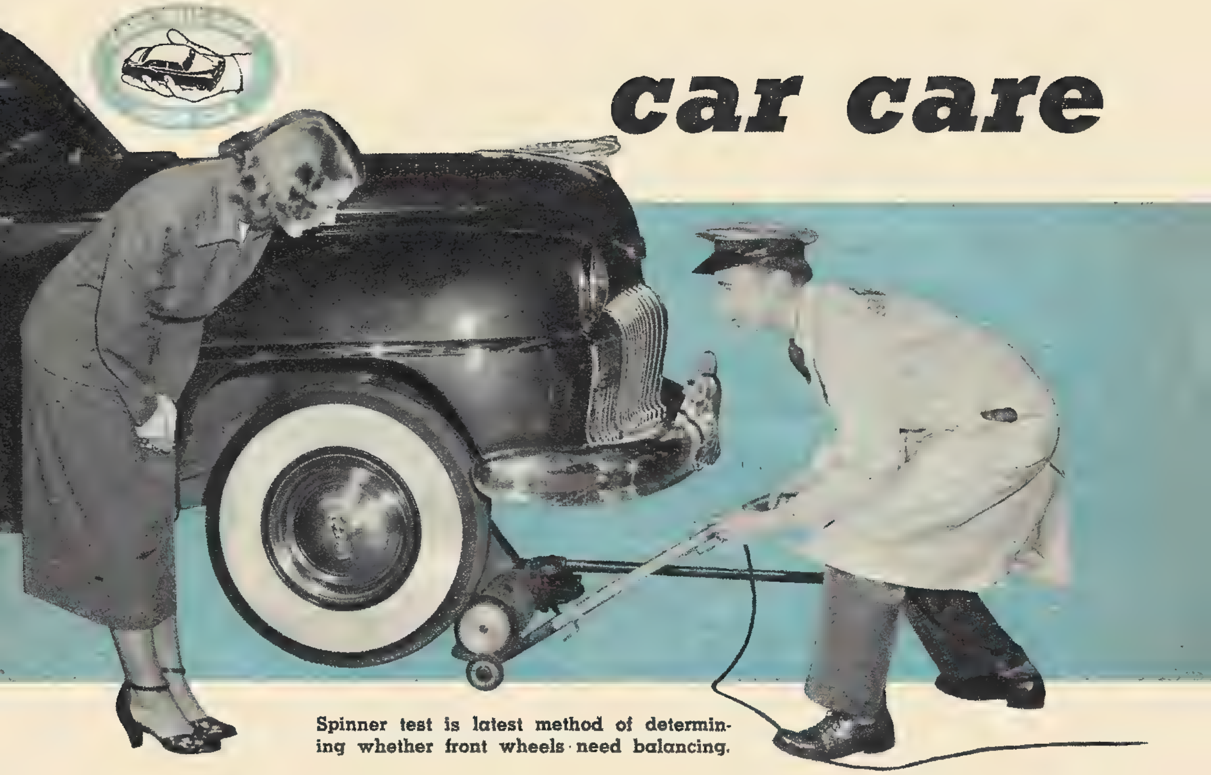
A saw guard that will protect both you and the blade can be fashioned by ripping about an inch off the grooved edge of a piece of flooring. Secure to blade with rubber bands cut from a discarded inner tube.

Some power tools have belt tension maintained solely by the weight of the motor, but motor and pulley bearings get excessively hot. This turnbuckle set-up will permit any desired tension on the belt.


TACK BANDS TO GUARD
HEAVY DUTY RUBBER BANDS
FLOORING STRIP
RIP OFF GROOVED PORTION AS GUARD


2 EYE TURNBUCKLE
MACHINE FRAME
WIRE AROUND MOTOR
HC
SECURE

car care

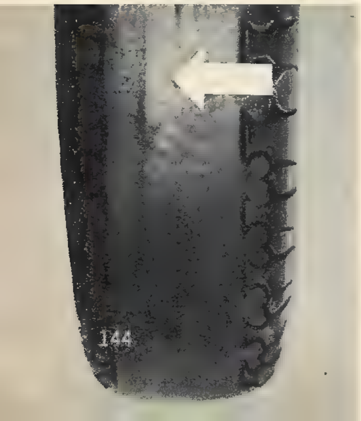


Spinner test is latest method of determining whether front wheels need balancing.

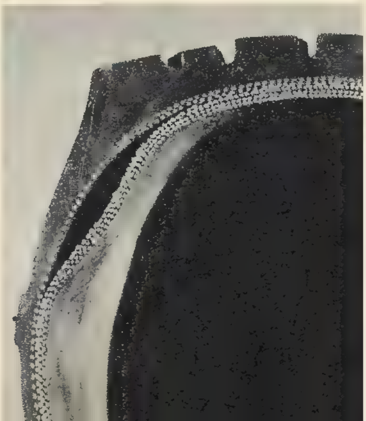
WITH tires again on the expensive side, and mileage the watchword, motorists are back at the old stand, stretching rubber. This time let's go at it more scientifically, and try to avoid getting hurt if it snaps. We may ride over those four hard working tires and tubes, but that's no excuse for overlooking them. Nor for getting into a lot of flats from ideas that should have been deflated when Detroit was a trading post.

Fresh in mind are such notions as not letting air out of a tire that has picked up pressure on the road, rotating tires as if this were some religious rite, forgetting about punctures if the inner tube is self-sealing, blaming alignment if the car wanders, putting the best tires on the front wheels to ease the shock if a blowout comes, or believing there can be no shimmy if the front tires and wheels are balanced. Even some of the ideas fed to us during World War II may need some revision. Rubber saving demands realism. And one of the most important steps in this direction is a frank admission of the need for better handling of the car. No tire is any better than the skill of the man at the wheel.

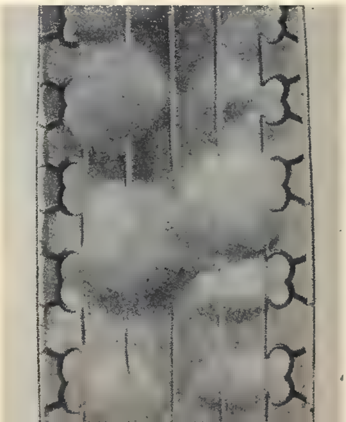
But first about letting out air. Manufacturers have warned that to deflate a tire that has picked up artificial pressure from heat and expansion you'll have an underinflated



If the tire tread is badly worn, at the center only, it usually means continued overinflation.



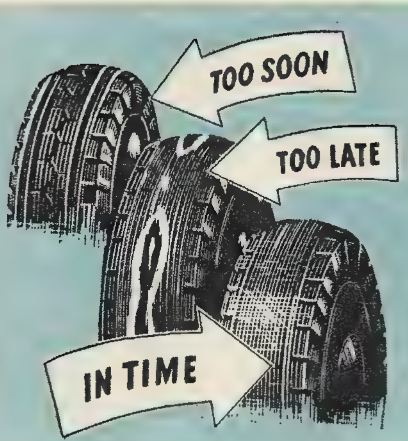
Continued underinflation means overheating, will ultimately cause plies to separate.



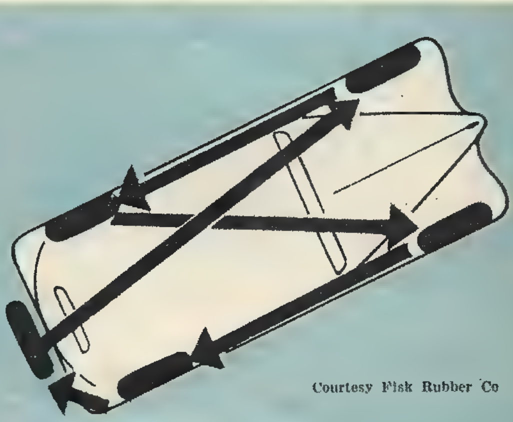
A tire that wears in spots may indicate an out-of-balance condition or brake fault.

more mileage from your tires

By Frederick C. Russell



If you are going to recap your tires, do it when a slight trace of tread is still evident. See drawing.



Courtesy Fisk Rubber Co

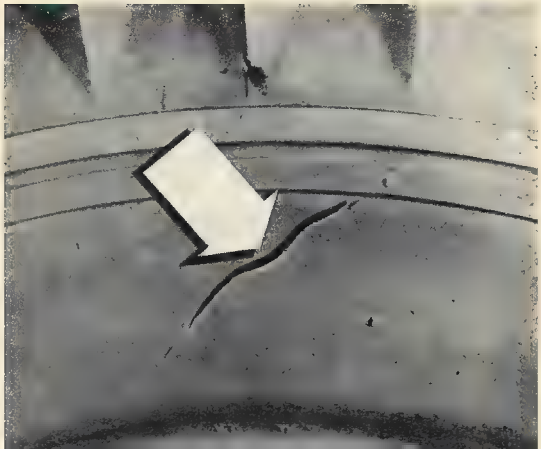
A common method of rotating tires which includes spare. Right front tire gets most wear.

tire when it cools. Today this idea has been junked. If you have been running around town and the car seems to be riding hard, get out your tire gauge and check pressures. Let us say the recommended cool pressure for the casings on your car is 25 pounds. Your gauge shows that pressure has jumped to 30. You then drop pressure to within three pounds above the cool pressure, or 28 pounds. On the open road you are permitted to drop the pressure 5 lbs. Here you'll probably find that the pressures have gone to 32, perhaps higher. Drop them to 30.

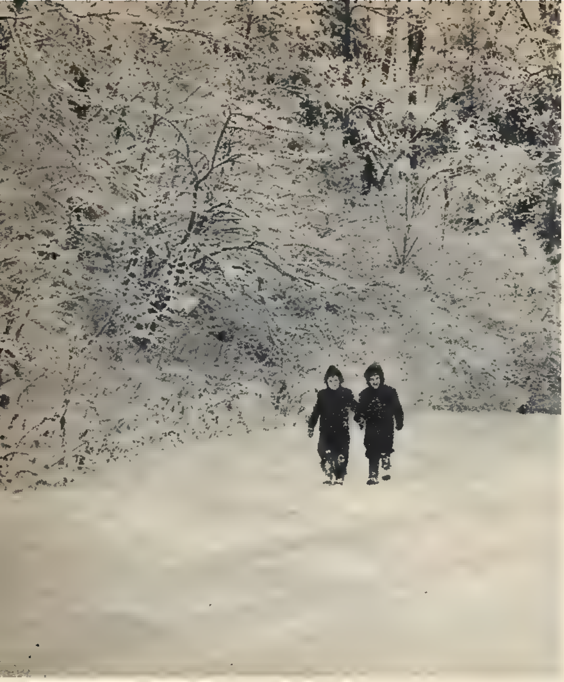
But be sure your gauge is accurate. It is well to take two readings of each tire, just to avoid error. And don't be surprised if the rear tires show more pressure build-up than the front ones. One tire manufacturer claims that the build-up is the same in winter as in summer, which reverses current ideas on this subject. It is friction between tire and road that causes the heat rather than temperature of the road or the air, according to this view. But I have seen exceptions.

As for rotating tires that is all right if you have ideal conditions, which are seldom found. Situations vary widely. For years the story has persisted that if the tires are left always in their original positions the ones on the rear [*Continued on page* 160]

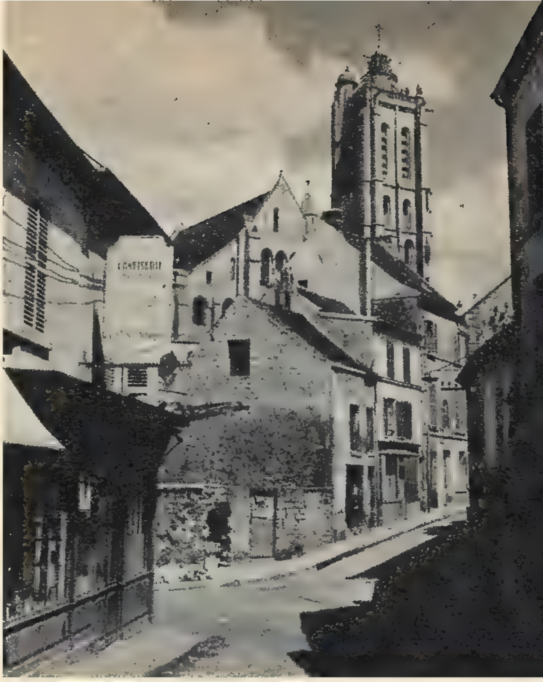
Neglected sidewall cuts will surely result in blowouts. Temporary repair can be achieved by using rubber tire dough. Vulcanize as soon as possible.



Chronic underinflation will show up as tread wear on shoulder of tire. It is best to check pressure with your own gauge rather than gauge on air pump.



First Prize ($10.00) ....**Wonderland**
By Joseph DeCaro of Fanwood, N. J. Taken with 4x5 Speed Graphic and Super Panchro Press film.

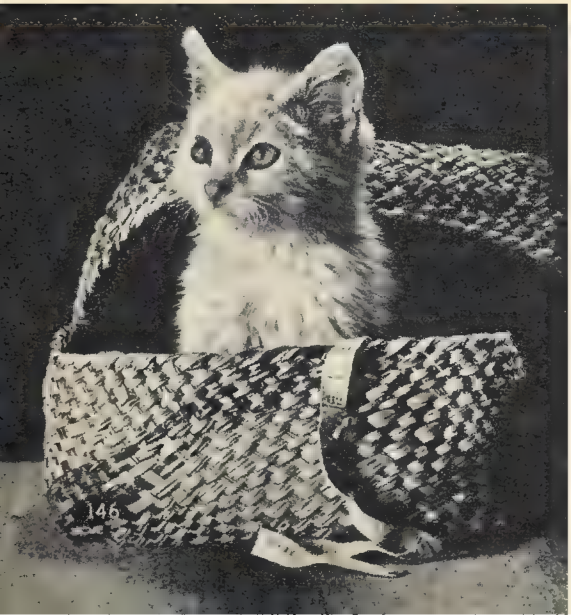


$5.00 Award ....**Village Street**
A street scene in Beaumont, France, shot by Friend Slote of Grand Island, Neb., 1/50 at f-8.

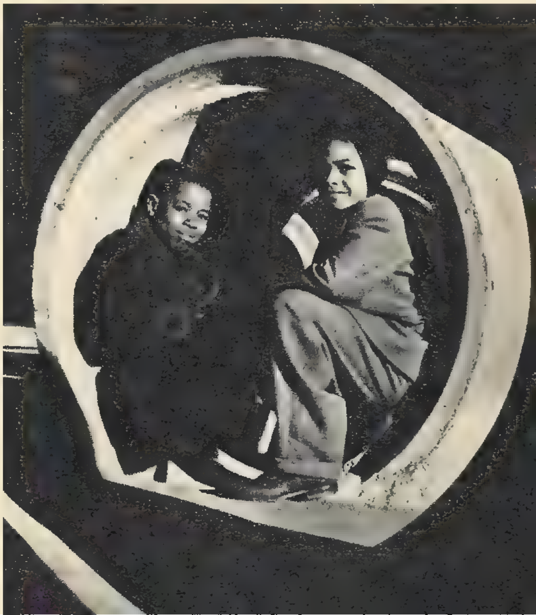
Monthly Photo Contest

Please put your name, address and picture-taking data on back of each print. Wrap with cardboard stiffeners and enclose a self-addressed stamped envelope or postage for return of unused photos. Prize-winning pictures are not returned. Judges are MI Editors. Duplicate prizes awarded in case of tie. Please address your entries to: Photo Contest, *Mechanix Illustrated,* 67 W. 44th Street, New York 18, N. Y.

$5.00 Award ....**Guilty**
Photographed by Dick Ferguson of Oakland, Cal., with a Rollei and three photofloods; 1/50 at f-5.6.



$5.00 Award ....**Playmates**
Taken by Yook On Hom of Brooklyn, N. Y. Super XX film in a Rollei Exposed at 1/100 and f-11.



combination RETOUCHING TABLE

By Phil Handy

IF you have the need for a retouching stand, a table for spotting, coloring or drafting, and even a stand for your typewriter, this versatile piece of furniture will answer all your needs.

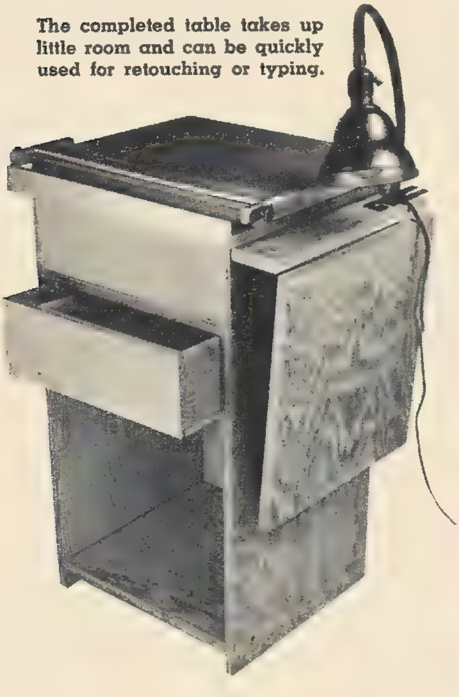
When it is completely opened it can be used as a negative retouching stand by placing the goose neck light behind the ground glass. It can also be used in many other ways by bringing the light around to the front.

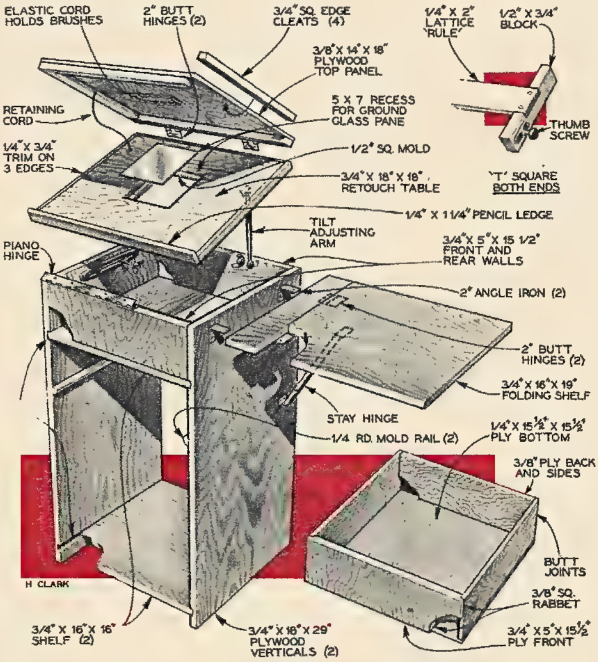
The T square with thumbscrew friction attachments at both ends permits you to keep the square stationary for use as a hand rest while working or it can be loosened to use in drafting or drawing.

When the table top is folded down flat it makes a handy typewriter table. When the typewriter is not in use it can be placed in the bottom of the stand.

The best material to use in constructing this is ¾ in. plywood. One piece four feet square will do and the total cost should be about $5.00. The drawer and top that covers the ground glass when not in use, can be made of ⅜ in. plywood. The ground or opal glass should rest on quarter round or an inexpensive picture frame. •

The completed table takes up little room and can be quickly used for retouching or typing.




ELASTIC CORD HOLDS BRUSHES
2" BUTT HINGES (2)
3/4" SQ. EDGE CLEATS (4)
1/4" X 2" LATTICE 'RULE'
1/2" X 3/4" BLOCK
3/8" X 14" X 18" PLYWOOD TOP PANEL
RETAINING CORD
5 X 7 RECESS FOR GROUND GLASS PANE
THUMB SCREW
1/4" X 3/4" TRIM ON 3 EDGES
1/2" SQ. MOLD
3/4" X 18" X 18" RETOUCH TABLE
'T' SQUARE BOTH ENDS
1/4" X 1 1/4" PENCIL LEDGE
TILT ADJUSTING ARM
PIANO HINGE
3/4" X 5" X 15 1/2" FRONT AND REAR WALLS
2" ANGLE IRON (2)
2" BUTT HINGES (2)
3/4" X 16" X 19" FOLDING SHELF
STAY HINGE
1/4 RD. MOLD RAIL (2)
1/4" X 15½" X 15½" PLY BOTTOM
3/8" PLY BACK AND SIDES
BUTT JOINTS
3/8" SQ. RABBET
3/4" X 5" X 15½" PLY FRONT
3/4" X 16" X 16" SHELF (2)
3/4" X 18" X 29" PLYWOOD VERTICALS (2)
H CLARK

Common Faults In Making Movies

How to take movies worthy of a professional with your present 8 or 16mm equipment.

By Emil E. Brodbeck,

Author of Handbook Of Basic Motion Picture Techniques.

A motion picture is a film on which hundreds of still pictures have been exposed one right after the other. However, if each of these pictures is not well composed in itself, then the overall appearance of the whole movie scene in which they appear will also be poor.

Incorrect panning is moving the camera back and forth, up and down, while shooting motion pictures of a stationary object. This is also an apt description of one of the most glaring faults movie-makers develop almost from the first scene they shoot. Don't you make the same mistake and here's why.

Hold a strip of movie film on which a pan scene has been made, up to the light and examine it. Do you have any idea as to what the cameraman was trying to show you, if not the motion picture which will result when these pictures are projected will be even worse.

Here's how the job should have been done. You should first take a good look at your subject, a church. You should note that the figures flanking the left wall of the doorway are both interesting and well lit. These figures then, are what you're going to lead up to.

First you get as far away as is necessary to show the whole church and some of its surroundings. You know you want to show the figures on the left wall of the main doorway. Your next shot should be of the whole doorway to show just where these figures are located. Finally come right up close and shoot a scene which shows the figures in detail. It is easy to see that the

Get a good close-up for detail, this will add a lot of interest to your movie. Be sure to get a long enough sequence to be able to enjoy the subject.

Tighten your tripod and shoot this scene, it should lead or follow your close-up to show the position of the figures as they are in the church doorway.

three scenes you now have are far superior to those pictures representing parts of a pan scene of the same subject. You made three separate scenes from three different angles and distances. You held your camera perfectly still for each scene. Thus your audience will get a well composed look at each view of the subject. Your film will make sense.

Unsteadiness when panning often is the result of holding the camera improperly. If you hand hold your camera your feet should be solidly placed, arms braced against the body, camera against the forehead. If possible, hold the breath for the duration of the scene. If you pan a moving object you'll find it will help tremendously to point your feet in the direction toward which the subject will go and unwind your body as you follow the subject. In this way you end your pan in a comfortable position and with the camera pointing in the same direction as your feet.

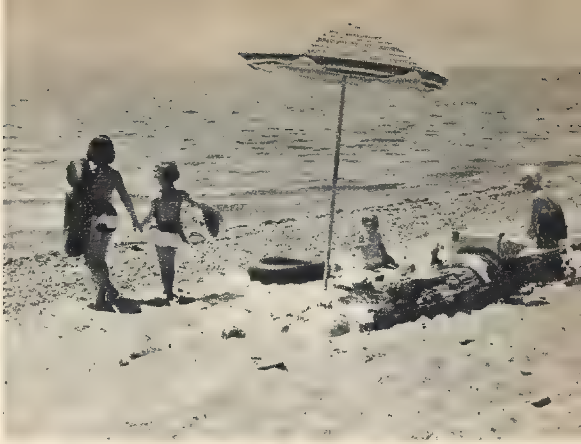
Except for beginning and end of a pan scene of a moving object, that object should be kept centered in your finder.

One reason not using the tripod is such a common fault is that so many folks get all tangled up in them. A trick of the trade is to make the two rear legs of the tripod the same length as each other while the forward leg is made about 1½ inches longer. When the tripod is put down, this longer leg rests on the ground first and leaves the two rear legs free so that you can pull them back and apart without their

You should always try to get far enough away from your subject to be able to get it all in for your main shot. Study the church to see when it is lit best.

If you can not find room to get back and get a good overall shot, get separate details of different parts of the church. Don't swing and swoop your camera.

This kind of scene is fine, they might even wave or make funny faces, but lock all the doors or your audience may be gone when the lights go on.



You can get enough shots of their faces without posing and getting them stiff, unhappy and self-conscious, but lead into the action gradually.

hitting the ground. You'll be surprised how much easier your tripod is to handle than when all the legs are the same length.

You can't expect your camera to see properly with a dirty lens. A bulb-type syringe of insect powder blower is excellent for blowing dirt off your lens. Avoid having to wipe your lens as much as possible by blowing it off before and after every day on which you use your movie camera.

Another fault of the average movie maker is that of not realizing that his camera lens is the one and only eye through which people who view his film can see what he is trying to show them. He'll shoot a set of scenes with no coherent relationship in the progress from one scene to the next.

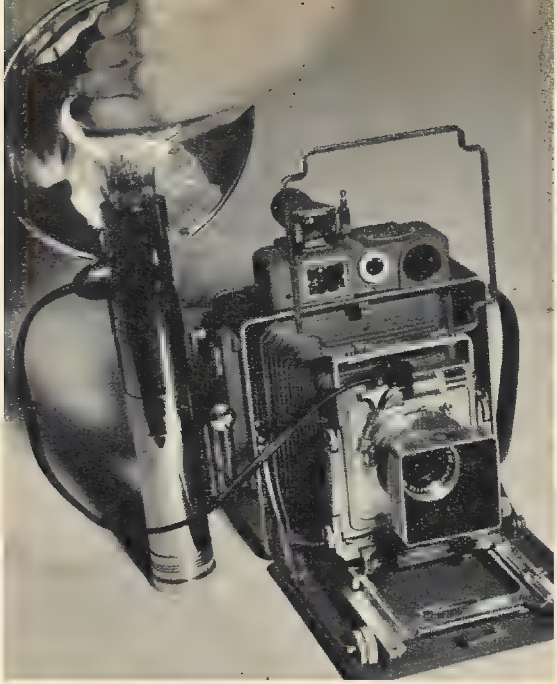
If the people viewing your film first see a scene showing your family they become interested in what is going on. You should make scenes which will show them what is happening. The child digging in the sand. Another member of the family blowing up a beach ball. And don't forget to move in for those big close-ups, they are the punch of a film because they give the audience a good look at the most important things you are trying to show. Stay away from posy or family album shots. Don't be over anxious to show faces. A rear angle shot is much better. It shows where the children are coming from and where they are going to. After the children are shown going into the water we move in closer and concentrate on just one child at a time.

If you make your family movies this way your audience is not going to be bored. Not only do you tell your film story in logical sequence but some of the scenes you introduce make it interesting to watch your film. Most anything you do can make an interesting motion picture story but in order to be a good story teller with a movie camera you must realize that your camera lens is the only eye anyone viewing your films will have.

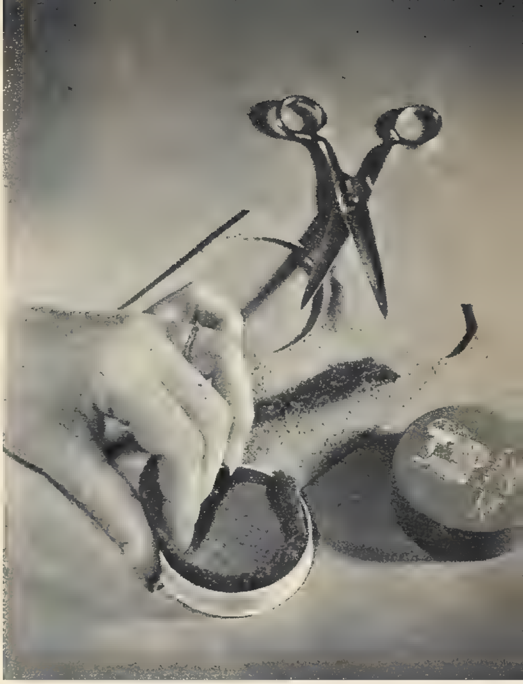
Remember the tips you have seen in this article and you will make the most common faults of the movie maker uncommon to your technique. •

A shot like this will produce a more interesting home movie. Catch the kids unawares and they're your best actors and they'll look more at ease.

Move in on one of them at play and you'll hardly be noticed. The big noticeable change will be in your films, they'll keep your audience awake.



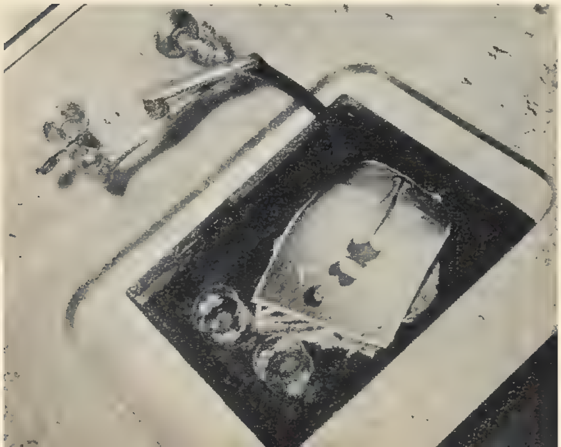
Hot stuff! Many photographers with itchy fingers have been burned when removing used flash bulbs from an ejectorless synchro attachment. This operation can be eased by using the carton in which the bulb came as a sort of glove with which to grasp bulb for safe and rapid disposal.



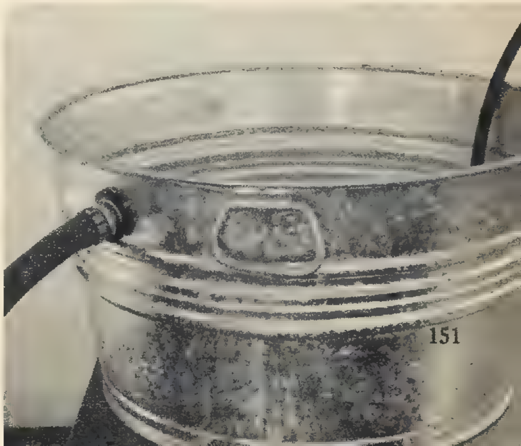
Typewriter ribbon cans make built-to-order containers for your filters and lenses. If latter are mounted, cement disks of gasket cork or cardboard to both of the inside surfaces, as illustrated above. For even further snugness, you may line the inside of the rim with felt weatherstripping.

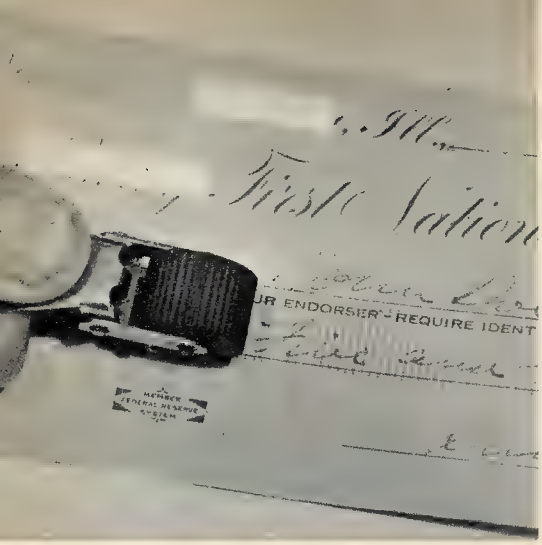
photo wrinkles

To prevent prints from sliding over the rim of your tray when being washed, fill a few tumblers with water and set them in the tray along the overflow edge. These barriers are heavy enough to deflect prints which would ordinarily have a tendency to flop over the tray during this procedure.



Washer costs $3.20, is made of a No. 1 galvanized tub, a clincher hose coupling, and a hose adapter. Punch hole large enough to accommodate adapter, which goes on inside of tub and is not visible in photo. Insert oiled leather washers against both sides of tub before attaching fittings.



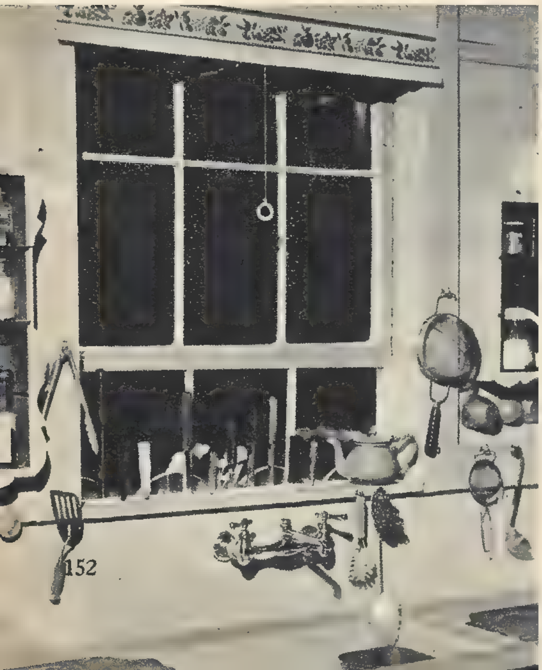


Handy check protector can easily be made from one of the small corrugated rubber rollers that are used to prevent automobile windows from rattling. Ink it on a regular stamp pad and roll it across your check. This will make erasures stand out clearly and discourage tampering.

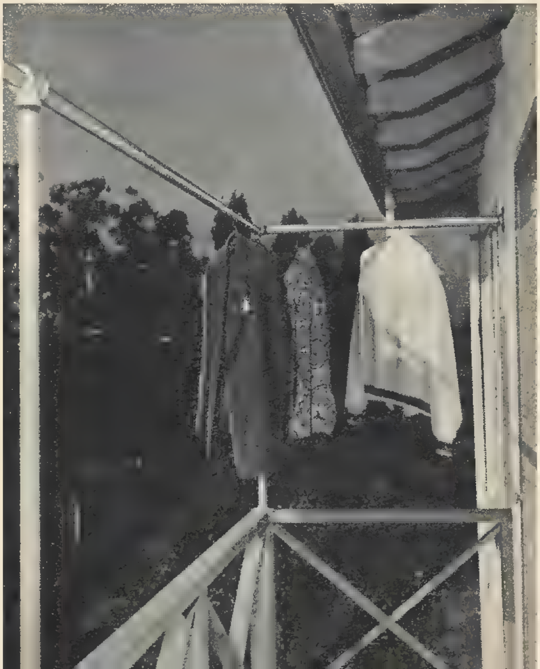
Dog gate. If you've ever had a dog that digs holes under your fences and lets the chickens out you will appreciate this gate that your dog can easily work himself. It consists of a metal flap that is hinged to the fence and can swing either way as the dog, not the chickens, goes either in or out.

home hints

Window sill knife rack is a useful addition to any kitchen. It can be made to hold any assortment of knives and it is much safer than groping for them in a drawer. To make the slits, drill two holes and use a keyhole saw. Finish off with sandpaper. Removing sill is unnecessary.



Overhead pipe rail is a splendid idea for airing clothes. Suits or dresses on hangers can be easily hung on the railing. It is also quite handy for airing blankets that usually pull down your clothes line. You might also quickly convert the railing into a support for a summer awning.

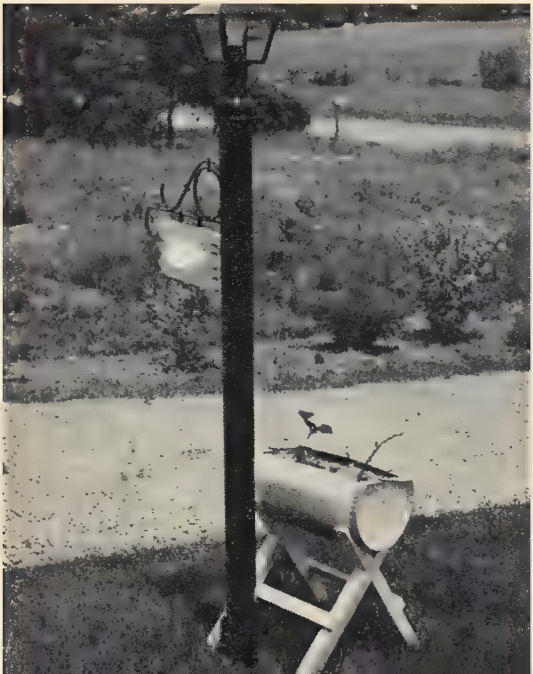


DURA-GLOS
ADY
EVE
MADE IN U.S.A.

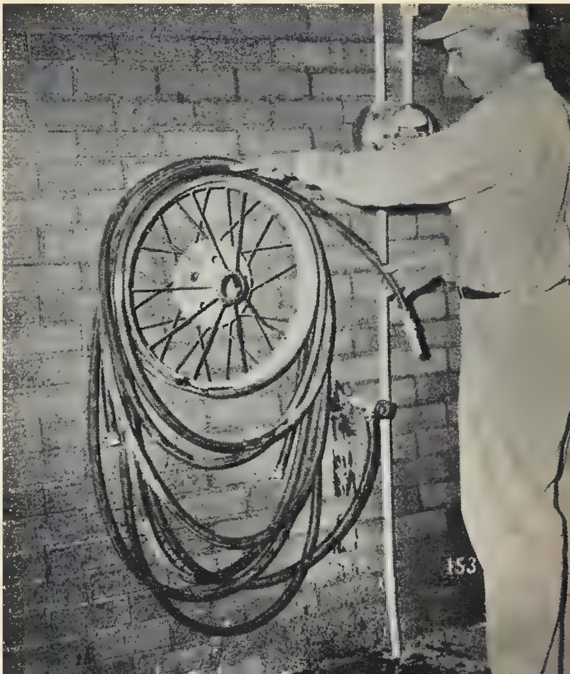
Flashlight battery protection. Spare cells should be protected by coating the positive poles with fingernail polish. This insulates the cell so that it cannot lose its charge when stored among metal tools or equipment on a trip. When you are ready to use a battery peel off the polish.

Tough fence. To keep the cost of repeated fence building down and still have a lock-up that will hold almost anything use steel rods, the type generally used to reinforce concrete. Set wood posts with holes drilled for five rods. Push the rods through the holes and weld the joints.

Nail keg flower boxes are only one of the many uses your empty kegs can be put to. This can be done by removing two staves to form a boat. Mount the open keg on a sawhorse made from scrap lumber, fill the box with dirt and plant your flowers. Paint it white or a light pastel color.



Hose holder that is both handy and easy on your hose can be quickly made by getting that old car wheel out of the cellar and bolting it to your garage wall or any other convenient place. Place it near a water outlet and you won't need to disconnect it. It will greatly prolong the life of a hose.

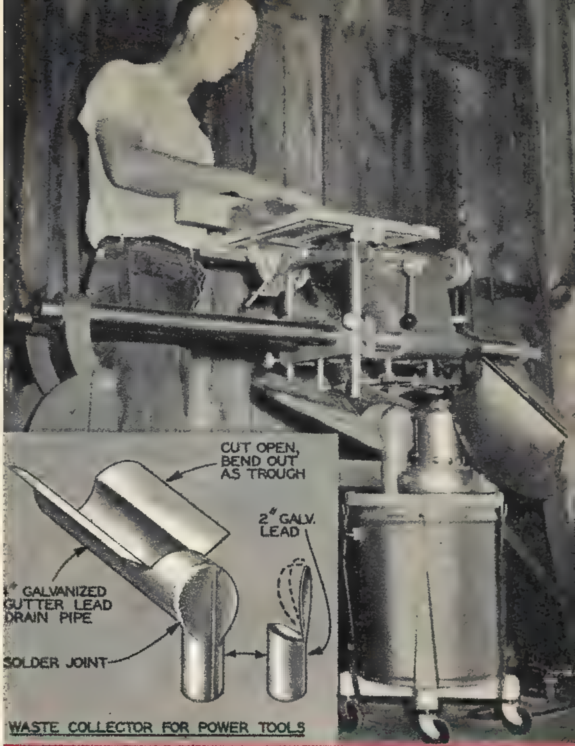


Shop Vacuum

By Bob Gilmore

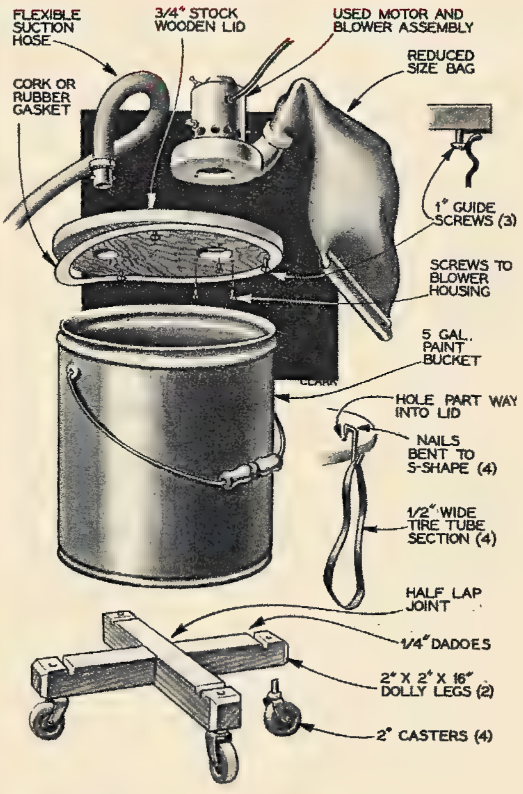
IN operation this vacuum cleaner for the home workshop has advantages over the ordinary type. Its castered base lets it roll about with ease while cleaning is performed, and heavy waste cannot enter to fill the bag. A special feature of this outfit is the collector chute for power tools, which will eliminate a lot of dust and sweeping.

The main parts are the base, made from two pieces of 2x2-in. stock and four casters; the collector can, simply an unaltered 5-gallon paint container; and the top, consisting of a scrap piece of ¾-in. stock or plywood. The other materials, a cut-down dust bag, fan and motor parts are from an old upright vacuum. The fasteners are made from slices of an old inner tube with heavy nails bent in the form of S-hooks, and the waste collector is nothing more than lengths of 2 and 4-in. galvanized gutter lead. Cement a gasket ring of ⅛-in. cork to the underside of the cover. Three screws driven [*Continued on page* 185]


CUT OPEN, BEND OUT AS TROUGH
2" GALV. LEAD
4" GALVANIZED GUTTER LEAD DRAIN PIPE
SOLDER JOINT
WASTE COLLECTOR FOR POWER TOOLS

Waste collector is inserted into the hole that ordinarily accepts the suction hose. The chute should be shaped to fit your own power tools.

Machine works with regular hose and attachments, of course, but it's a good idea to keep peace in the family by getting your own set.


FLEXIBLE SUCTION HOSE
3/4" STOCK WOODEN LID
USED MOTOR AND BLOWER ASSEMBLY
REDUCED SIZE BAG
CORK OR RUBBER GASKET
1" GUIDE SCREWS (3)
SCREWS TO BLOWER HOUSING
5 GAL. PAINT BUCKET
HOLE PART WAY INTO LID
NAILS BENT TO S-SHAPE (4)
1/2" WIDE TIRE TUBE SECTION (4)
HALF LAP JOINT
1/4" DADOES
2" X 2" X 16" DOLLY LEGS (2)
2" CASTERS (4)

Looking for a down-to-earth price tag?

KODAK HOBBYIST ENLARGER—$57.50

Complete with lens! New-type lamphouse designed so all light reaching negative is *reflected* light. New-type interior reflective coating gives remarkably *even* light distribution. Newly designed negative carrier for easier loading. Locking knobs for both elevation and focus. Enlarges up to 7 times. Kodak Enlarging Ektanon Lens, *f*/6.3, with click stops.

KODAK'S MODERN "COLD-LIGHT" ENLARGERS

Want magnificent enlarging PLUS?

KODAK FLUROLITE ENLARGER

Circular cold-light fluorescent lamp, integrated with a new reflector design, gives you the speed and brilliance of a condenser system. Light is instant-on, instant-off . . . negative carrier tilts and rotates for control of distortion . . . base has big (17 x 21¼ x 5-inch) light-tight paper cabinet. Assembly can be used for cine-titling, photomicrography, and as view camera. Without lens—$112.50.

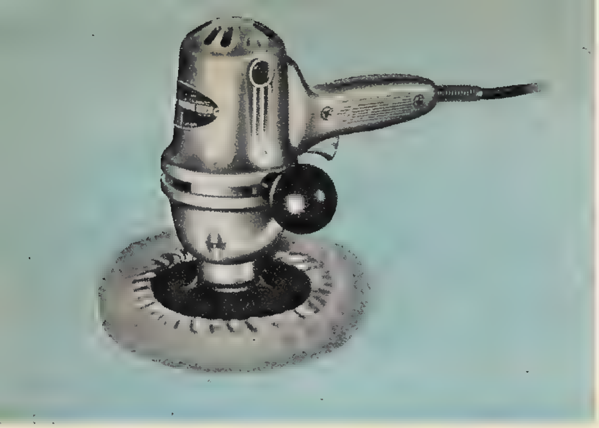
Kodak Enlarging Lenses for the Flurolite range from the Kodak Enlarging Ektanon Lens, 2-inch *f*/4.5 (for negatives up to $1\frac{3}{16}$ x $1\frac{9}{16}$ in.)—$22.50 . . . to Kodak Enlarging Ektar Lens, 4-inch *f*/4.5 (for negatives up to 2¼ x 3¼ in.)—$56.00.

Prices include Federal Tax

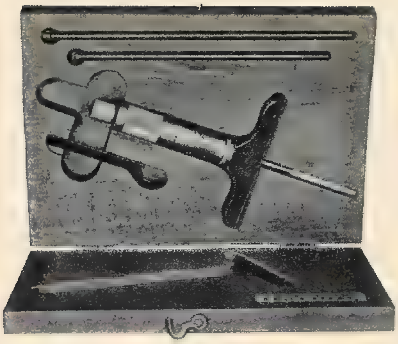
Prices subject to change without notice. Consult your dealer.

EASTMAN KODAK COMPANY, ROCHESTER 4, N. Y.

Kodak
TRADE-MARK



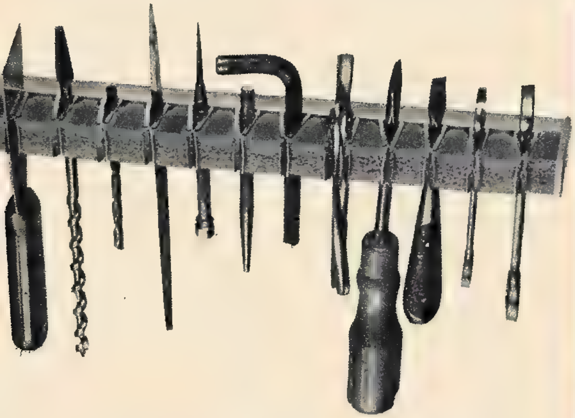
Attachments extend use of this sander-polisher for work on surfaces—flat, concave or convex—of wood, metal, stone and plastics. It takes 6-in. disks. Cummins Portable Tools, Chicago.



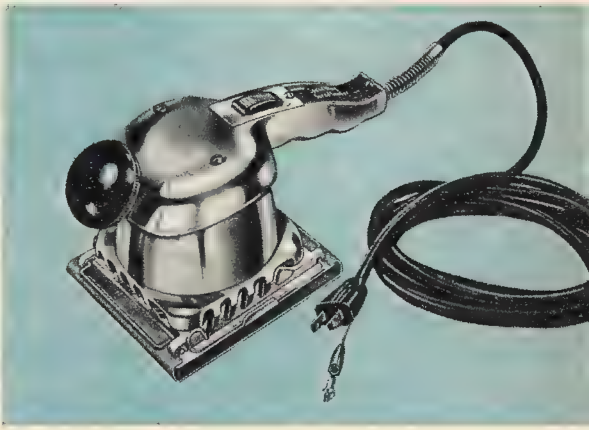
Micrometer depth gauges are rust resistant, have no-glare chrome finish on sleeves and thimbles for easy readings. Size ranges: from 0 to 3 in. or from 0 to 6 in. Starrett Co., Athol, Mass.

NEW for the SHOP

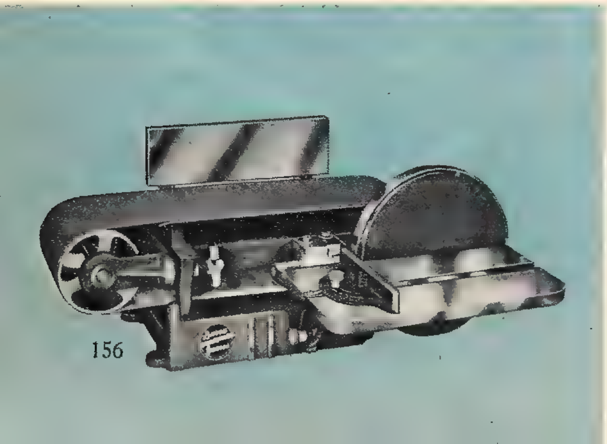
Graspall, a self-adjusting tool holder made of sponge rubber and aluminum, comes in 11¼-in. lengths, costs $1.49. Unit offers constant grip and prompt release. R. K. Products, Portland, Ore.



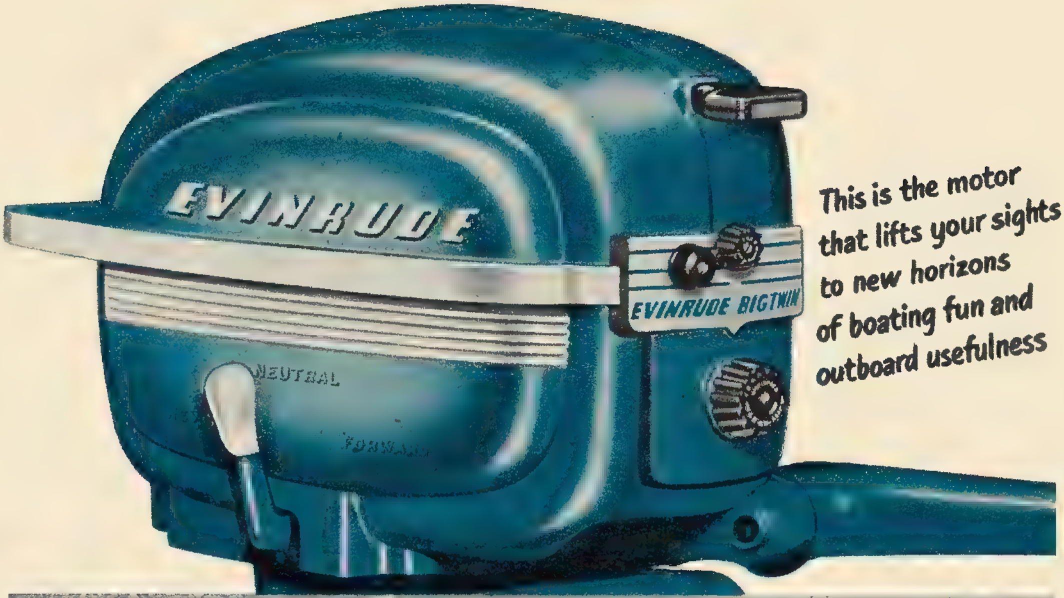
Sander with 3/16-in. orbital motion can get three sanding pads from a sheet of sandpaper. Handy knob is removable for working in corners. AC only, $34.50. SpeedWay Co., Cicero 50, Ill.



Belt and disk sander has cast iron frame with polished steel platen. Accommodates 8-in. disks and 6x44½-in. belts. Table tilts 45°, has etched miter gage. Toolkraft Corp., Springfield 1, Mass.



Tilt-top dividers in this parts cabinet let you examine and choose hardware quickly. Cabinets with 8 to 108 drawers are now available. Unit pictured sells for $21.50. Equipto, Aurora, Ill.



This is the motor that lifts your sights to new horizons of boating fun and outboard usefulness

BIG TWIN by EVINRUDE

25 HORSEPOWER*

only 85 POUNDS

new HANDLING EASE

ROTO-MATIC CONTROL

GEARSHIFT

CRUIS-A-DAY TANK

... it's years ahead!

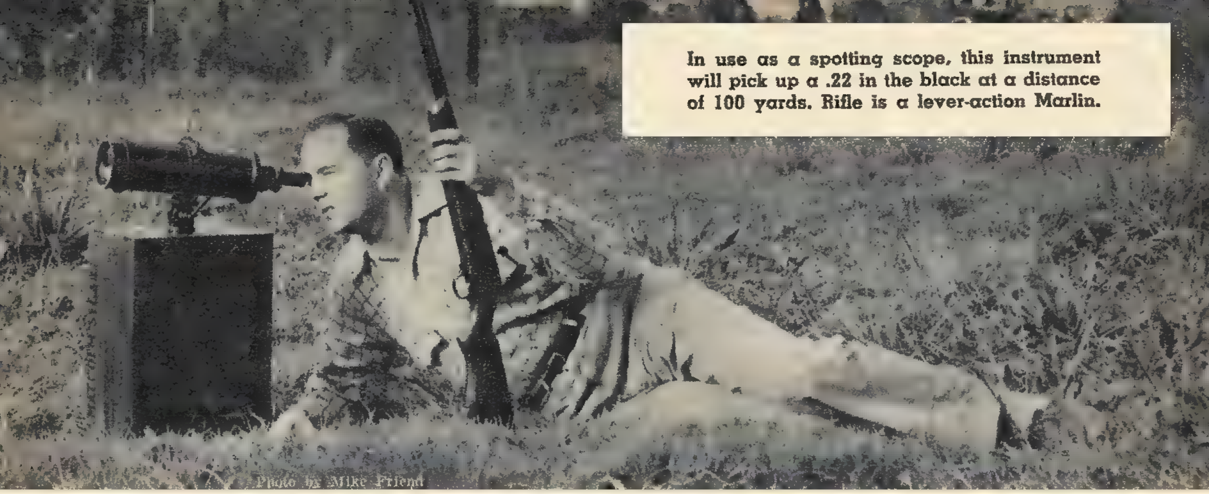
You've heard about a great new Evinrude . . . a motor that packs the wallop of 25 sharp and solid horsepower *in only 85 pounds* . . . a motor that thrusts the thrill of exhilarating speed into big boats, heavy loads . . . the one that takes off like a scared cat, trolls like a sweetheart, handles like a dream . . . and is *excitingly priced* within the reach of all! *This is the one* . . . BIG TWIN . . . it's *years* ahead! BIG TWIN gives you Simplex Starter for starting ease—and Roto-Matic Control—every speed right in your hand! Gearshift with Neutral, Forward, Reverse! Separate, big-capacity Cruis-A-Day Fuel Tank! Full range performance—less than 2 to over 30 miles an hour on able boats! SEE THE BIG TWIN—see the complete 1951 line at your Evinrude dealer! Look for his name under "Outboard Motors" in the yellow pages of your phone book. CATALOG FREE—write for it today! Address EVINRUDE MOTORS, 4604 N. 27th St., Milwaukee 16, Wis.

In Canada, Evinrude Motors,
Peterborough, Ontario

$390.00

*O.B.C. Certified brake H.P. at 4000 R.P.M.

F. O. B. Factory, Milwaukee, subject to change without notice.



In use as a spotting scope, this instrument will pick up a .22 in the black at a distance of 100 yards. Rifle is a lever-action Marlin.

Photo by Mike Friend

The Amateur Telescope Maker's Page

Conducted by Robert Brightman

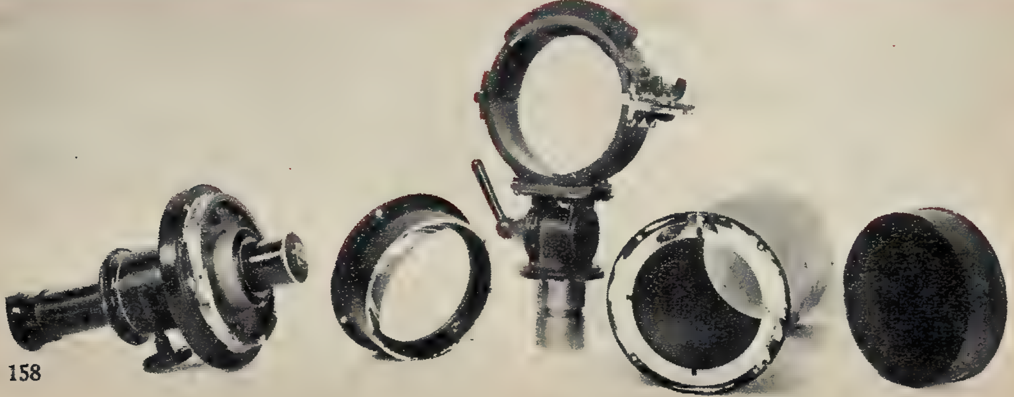
TO some people a telescope always means a refractor, instead of a reflector. This, despite the fact that the vast majority of amateur telescope makers always start out with the latter type of instrument as their first endeavor.

The price of a fine quality achromatic objective is usually the greatest deterrent for the average telescope maker when he starts considering the construction of a refractor. Obtaining a large diameter, short focus lens, suitable for use as a spotting scope or a richest field telescope has until now been well-nigh impossible, unless he has been willing to spend about $100 for such a lens. To this of course, must be added the cost of machining a cell and the construction of a suitable mounting.

One of our readers set out to see if he could lick the cost problem by searching the government surplus optical markets—and came out with a happy surprise. His letter follows:

> *The innocent looking Reflector Gunsight Mark II contains the components for a wonderful telescope. Every part of this gunsight can be used. The first two lenses make up an achromatic objective. The cell is made from part of the aluminum body and the mounting saddle from the reflector holder. I paid $25 for such a telescope complete with a storage box.*

To get at the components below, dismantling of the gunsight should be done carefully. A solvent, such as carbon tetrachloride, should be used before attempting to remove lenses from cells.



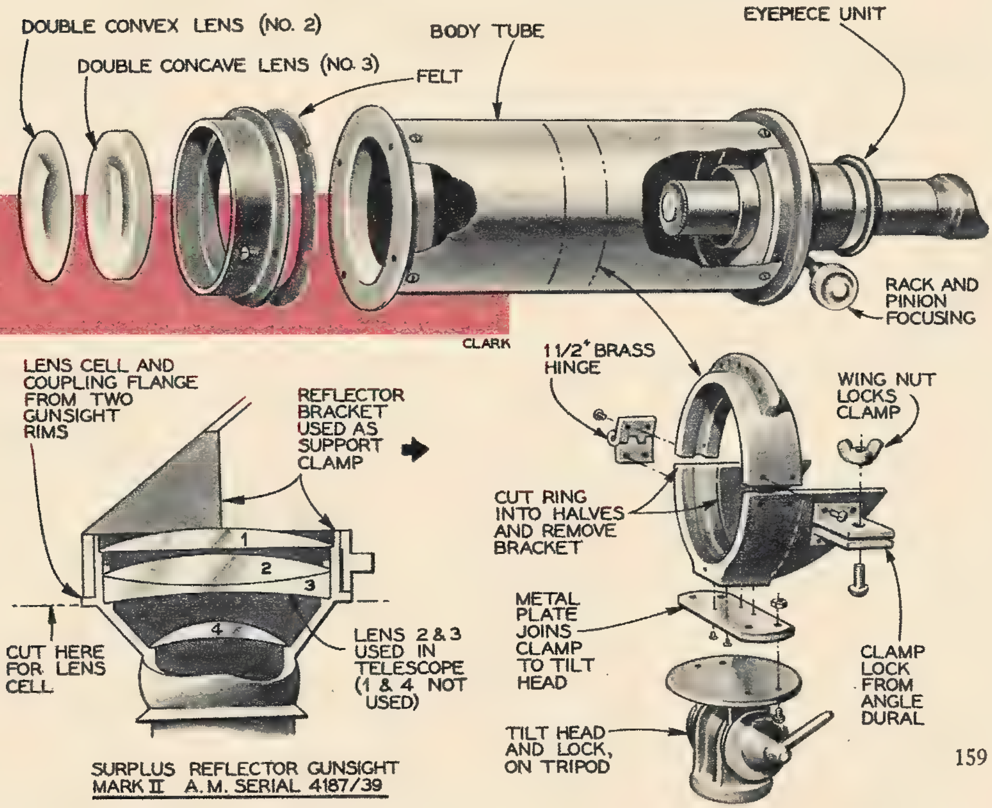
The optical parts of the "surplus" instrument. It is known as a Reflector Gunsight Mark II.

The completed telescope set up on a camera tripod. It has a 40° field of view and a power of 12x.

Dismantling the gunsight should be done carefully and with patience. Do not use strong arm tactics. First remove the glass reflector and its holder. Observe that on its large side it contains a convex lens. To remove this lens, dip a brush into a solvent, like carbon tet, and run it around the retaining ring holding the lens. The solvent loosens the cement which was applied at the factory to assure a weatherproof seal. After a while, tap the retaining ring lightly with the wooden handle of a screwdriver, then place the tip of the screwdriver into the notch on the retaining ring and tap lightly. The ring should loosen and you should be able to unscrew the retaining ring and thus remove the lens.

Beyond this you will find another lens. It is a double convex lens which will form the first element of your achromatic objective. To remove this lens, repeat the same process as before.

Now, then, after you have removed the retaining ring on this lens, turn the gunsight over very carefully and let lens No. 2 slide out slowly. If you are lucky, lens No. 3 will come out with it. If it does [Continued on page 192]


DOUBLE CONVEX LENS (NO. 2)
DOUBLE CONCAVE LENS (NO. 3)
FELT
BODY TUBE
EYEPIECE UNIT
RACK AND PINION FOCUSING
CLARK
LENS CELL AND COUPLING FLANGE FROM TWO GUNSIGHT RIMS
REFLECTOR BRACKET USED AS SUPPORT CLAMP
1
2
3
4
CUT HERE FOR LENS CELL
LENS 2 & 3 USED IN TELESCOPE (1 & 4 NOT USED)
SURPLUS REFLECTOR GUNSIGHT MARK II A.M. SERIAL 4187/39
1 1/2" BRASS HINGE
WING NUT LOCKS CLAMP
CUT RING INTO HALVES AND REMOVE BRACKET
METAL PLATE JOINS CLAMP TO TILT HEAD
CLAMP LOCK FROM ANGLE DURAL
TILT HEAD AND LOCK, ON TRIPOD

[*Continued from page* 145]

will wear more than the front tires. Just look at any 7 cars out of 10 parked on the neighborhood movie lot, however, and you'll find just about the reverse—front tires badly worn because of misalignment. Also you'll find that the right front tire, shows more wear than the left tire. That is because the right front tire usually suffers most from misalignment. In many parts of the country it is beaten down because of crowned roads.

Another objection to being a rotation hound is the fact that some tires have treads designed for rear wheel use only. If these are switched to the front there will be rumbling. And if plain ribbed tires (without cross-cuts or other anti-skid features) are switched to the rear—well, you know what happens in skiddy weather. Any plan of rotation has to be matched to suit the car.

Often if front tires are worn cupped because of bad alignment, and the treads are suitable for rear wheel use, they can be evened off by use on the car's stern. In theory, if the spare is worked into a plan of rotation at 4,000-mile intervals the mileage on each tire will be only 16,000 when the car has completed 20,000 miles. But here's something that ought to be in red letters: *How you drive has more to do with what happens to each tire than its relative position on the car.*

One manufacturer tested 30 cars of the same make and model, equipped with the same make of tire. Five of the cars came back needing new shoes after mileages ranging from 7,500 to 9,400 miles. The next seven did a little better, showing top mileages of 11,800 to 13,700. Slightly better results were shown by the next seven drivers, but the next six really showed steam. They stretched their rubber to the range from 16,100 to 18,700 miles. The top five actually got 20,700 to 27,600 miles.

A little incident will explain how mind plays a big role in tire results. It will deflate that current notion that you need not worry about punctures with self-sealing inner tubes. Well, the gent in question didn't bother to check over the shoes and pull out embedded nails, glass and stones. Then one of the tires went flat. A nail, sticking into the inner tube, finally tore a hole so big the tube couldn't seal itself.

Naturally front-end alignment is important, but don't blame it for everything the car doesn't do properly with respect to steering. You can get wandering and weaving from nothing more exciting than bald front tires. Even underinflation will do it, and this can be the rear tires as well as the front. A pull or lead to one side can be due to unequal inflation of the front tires or to not having matched treads. Tires that are too large for a car will cause hard steering, and shimmy often is caused by underinflation. Heavy inner tubes may also be a factor.

No race driver would advise putting the best tires on the front wheels because he knows from rough experience that a rear tire blowout is tough to handle: You don't steer the rear wheels. A blowout up front can be more easily controlled by hanging on to the wheel to keep the car to a straight course while it loses speed. He wisely puts good tires all around and gives the questionable ones to the Indians. If it is just a matter of skid protection for winter use, of course, the best treads should be at the rear.

Balance is important enough for tire life, but just because they have hung weights on the front rims and have taken part of your weekly pay for a careful job is no reason to believe that the front wheels are immune to shimmy. Even at low speed with the tires and wheels skillfully balanced shimmy can develop from excessive caster, loose wheel bearings, weak and broken springs, a bent spindle, defective shock absorbers, ordinary looseness in the steering system, and that old standby underinflation. In high speed shimmy add excessive toe-in or toe-out, an unbalanced propeller shaft, loose engine mounts, wobbling wheels, defective shackles, unequal inflation, a broken front body bolt, unbalanced rear wheels or a weak frame.

It very definitely changes the picture. Much of the advice on tires could stand review in order to focus attention on the importance of each individual situation. Suppose, for example, that the car is a little heavy for its tires, or happens to be overloaded for a trip. The pressure picture will then be different. Extra pressure may be desirable in this case. It might result in more flexing of the sidewalls which is such a factor in heating. Then, too, we have different tire characteristics, some shoes running cooler than others. Some are much stronger.

Synthetic tubes are not porous and thus do not lose air pressure like those of natural rubber. It is not unusual for pressures to stay up for a year. But the tire valve may leak, so check as usual. Also check once a week if one or two of the inner tubes are of natural rubber. Frankly, it's better to have all natural rubber tubes, or all synthetic. There's less underinflation with synthetics, but we've seen fellows put too much air into synthetics just because no additional air has been needed for so long. Some owners just don't believe their gauges or their eyes. •

Feather Merchants

[*Continued from page* 80]

been working on a long-time project to convert feathers into plastics, wondered idly what would happen if you heated the stuff with steam. Simple? Nobody had ever done it.

Binkley tried his idea and obtained a black free-flowing material which could be dried and then ground into powder. The 50-year-old chemist had no notion of the significance of his discovery until days later when he learned that most researchers turn up an intermediate gummy substance which usually fouls up the kettle and imposes a messy cleaning problem.

Preliminary tests indicated that the black powder had good qualities as a fertilizer. The best results were obtained, he discovered, when the feathers cooked for one-half to an hour under 40 to 60 pounds of steam pressure.

Last November Binkley and his colleagues demonstrated the technique to intrigued poultry processors and government representatives. Since then, the Department of Agriculture has been busy answering inquiries from ex-GI's who'd like to become feather merchants and from kettle owners who want to make extra cash.

What's so good about feather fertilizer? Well, for one thing, it has the same nitrogen content of the original feather or about three times more than popular plant foods. It holds water better too and is effective as a conditioning agent for phosphates and other inorganic mixed fertilizers since it will prevent caking from moisture absorption. It appears especially good for greenhouses and lawns because it releases nitrogen slowly.

Either wet or dry feathers can be used in the Binkley process and you don't have to worry about cleaning the stuff beforehand. Binkley has found everything from cigarette butts to machine parts in the feather piles he's worked with. But he really got a surprise one afternoon when the kettle began to wheeze and act up. Checking inside he saw the reason—a nugget of pure gold.

"How it got there is still a mystery," he says with a grin, "but one researcher suggested it might be a good idea to shake out the stomachs of California's chicken population and perhaps open up a new mother lode."

If you'd like to find your gold more easily, though, the research lads think there may be a cozy source of income in showing officials of your town how chicken feathers can save lives. That little trick isn't as fantastic as it sounds.

"The fertilizer powder made from steam-heated feathers," explains Binkley, "can be turned into fire-fighting foam. You simply add an acid to get a product that resembles a stiffly-beaten egg white. When this combines with water and air in a nozzle, the resultant spray is one of the best methods we have to lick gasoline and oil fires."

Poultry plumage can also be converted into fiber brushes if you want to cash in on the discovery of young Dr. Harold P. Lundgren, Western's brilliant protein chemist and pioneer feather worker. During the early years of the war Dr. Lundgren had an idea that you could turn chicken feathers into fiber chemically. Since feathers are composed of a pure protein called keratin, the theory was that a little rearrangement of the molecules could give you a material that would stretch into thread. But how do you dissolve a feather without ruining its chemical structure? It took some painstaking digging but Dr. Lundgren finally found the answer.

These synthetic fibers have limitations as a raw material for fabrics since they lose half their strength in water, but last year manufacturers discovered that they can be turned into good-quality bristles. This new development is pretty timely since recent curtailment of Chinese hog-bristle imports has cut the supply for most commercial paintbrushes.

Anytime you'd like to go after the Hollywood glamor trade just let the Western Research boys know. They can show you how to turn poultry pluckings into beautiful wigs. A movie-colony make-up specialist was so impressed with the silken hairlike qualities of feather fiber he suggested its use as a new source of artificial head covering. The researchers promptly went into action, soon discovered that feathers from a Rhode Island Red can be turned into a glamorous carrot top while the plumage of a white Leghorn would yield a shimmering blonde thatch that Betty Grable might envy. Now it looks like movie stars may be showing off their feathers one of these days—in technicolor.

The scientists have also converted feathers into plastics, adhesives, plaster retarder and certain building materials, but the most fascinating application to come out of the cauldron is chicken feed. Feathers are rich in a highly digestible amino acid, which chicks need to grow into juicy roasts. Large-scale feeding tests are yet to be made but lab indications are that feathers may soon be fed back to the chickens.

Researchers say there will be more feathers in your future. But regardless of what they turn up next, one thing is certain. They've already converted the feather merchant into a useful and hardworking citizen. •

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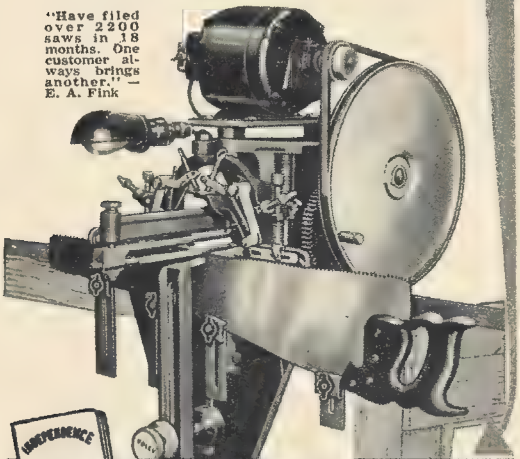

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MI Tests The '51 Ford

[*Continued from page* 88]

or more. The Olds can peel the paint off the Plymouth in top speed and pick-up but the Plymouth with a modernized old-type L-head engine has the staying power and that's what's been paying off. Fords are rarely in the money in these races any more and all you old-timers know this is quite a reversal from just a few years ago, when Ford was King.

When you question company officials about these things, as I did, they immediately assume a Madonna expression and practically grow a halo as they tell you something to the effect that "our company is not concerned with speed and racing" and then they tell you how The Company has dedicated itself to Safety, my my. Nevertheless, Ford's hot performing reputation sold millions of cars when there was no other earthly reason for buying them, rough and uncomfortable and (for years) practically brakeless as they were.

Ford has a new overhead valve V-8 engine which they will most likely spring on the Mercury first. They also have an overhead-valve six. These are Ford's Sunday punches —and their introduction date depends on the state of the nation and the state of the competition. My guess is late next fall, if we are not at war.

The new Ford bodies are much quieter and better put together than former models. The brakes are excellent and 40,000 miles is a cinch, with average driving, before relining. The starting has always been tops. This is due to a good battery and a fairly hot ignition system. A feature new to Fords is the counter-balanced trunk lid. They also now have foam rubber seats and much better coil springing in the front end.

I made my test of the new Fords on the Ford proving grounds and track. All the cars I drove were equipped with Fordomatic transmissions. I went around the track many times and had plenty of time to think, as this job had nothing sensationally new in performance compared to their standard cars I had tested very often in the past. I have driven thousands and thousands of miles in '49 Fords and have found out that if you handle them right they'll corner and hold the road with any car made in America. They won't stay on the road worth a hoot if you take your turns wide but if you practically brush the curbing on the inside and cut fast while feeding plenty of gas, they'll stick like glue with hardly any roll. I have watched other heavier, fast American cars almost roll over on the Penn Turnpike, trying to stay with me through curves. They couldn't do it when I had plenty of

[*Continued on page* 164]

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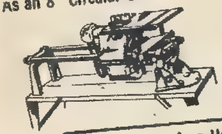

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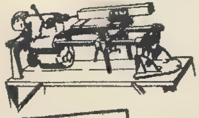

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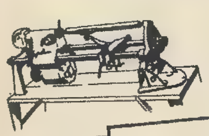

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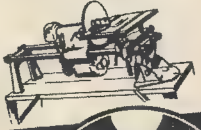

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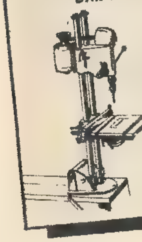

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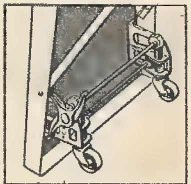

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MI Tests The '51 Ford

[*Continued from page* 162]

air in the tires and stayed close to the inside.

Oddly enough, I don't know of a car on the road that has less straightaway traction in mud, snow or ice. A one-legged kangaroo on a greased pole has more forward push than a current model Ford bogged down on ice or snow. This is because they shoved the engine so far forward—to get a midship ride for your mother-in-law in the back seat—that a Singer's midget can almost lift the rear wheels off the ground.

In spite of this, the 1951 Ford is a quality job throughout and the finest Ford in the company's history. The biggest advancement I think they have made, aside from glueing them together right for a change, is in the new station wagon. Short of swiping blueprints, this is a direct design steal from the Plymouth Suburban we raved about early last year. The Ford station wagon now is a usable buggie and all the impractical features of the first model, such as the half-drop tail gate and the chopped up two level-baggage space, have been eliminated.

In summing up, I find that though the Ford V-8 is no longer the undisputed champion of performance, it is now a well rounded, quality automobile that should prove reliable, comfortable and rugged. With a choice of three transmissions, there is no better buy for my money. •

SPECIFICATIONS

MODEL TESTED:

1951 Ford V-8 deluxe sedan with Fordomatic transmission

ENGINE:

8 cylinder, V-type; bore 3.1875 inches, stroke 3.75 inches; maximum torque 186 foot pounds @ 2000 rpm; brake horsepower 100 @ 3600 rpm; compression ratio 6.8 to 1

DIMENSIONS:

Wheelbase 114 inches; overall length 196.8 inches; tread 56 inches front, 56 rear; width 72.8 inches; height 63.2 inches; weight 3240 pounds; standard tire size 6.70x15; gas tank 16 gals.

PERFORMANCE:

0 to 30 mph, 5.4 seconds (using Low and Drive)
0 to 30 mph, 6.1 seconds (using Drive only)
0 to 50 mph, 12.0 seconds (using Low and Drive)
0 to 60 mph, 16.0 seconds (using Low and Drive)
0 to 60 mph, 16.6 seconds (using Drive only)
0 to 70 mph, 23.0 seconds (using Low and Drive)
30 to 50 mph, 6.3 seconds (using Drive only)
30 to 60 mph, 11.2 seconds (using Drive only)
Half-mile from standing start, 34.2 seconds
Top speed, 90-94 mph

SPEEDOMETER ERROR:

At 60 mph on speedometer, actual speed 56.42 mph

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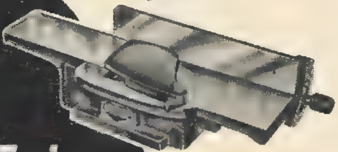

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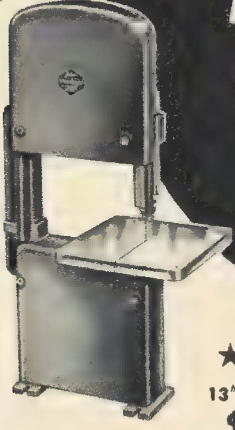

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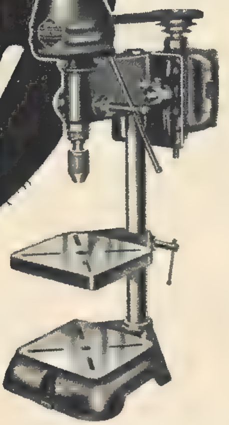

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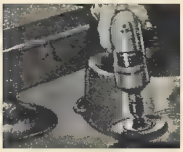

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McCahill Drives Nashes

[*Continued from page* 92]

my runs between takes. So I waited to try out the Rambler this time on the Nash proving grounds where they could hardly say "Look, Herman, this job's not running right."

The one I selected was the Rambler station wagon. I was frankly amazed at the pick-up and wallop this two-by-four wheelbarrow possessed. Zero to 60 in 16.9 seconds wasn't bad but the real surprise was going from zero to 30 in 4.4 seconds! This is jump starting in any league.

I was highly impressed with the way this wagon held the quite flat corners of the Nash track at high speeds and the way the short (by American standards) 100-inch wheelbase makes road control and driver command a cinch. This Rambler station reminded me of an un-preshrunk Plymouth Suburban, to which it is very similar. It is short in carrying capacity but long in sitting comfort and, oddly enough, has much more leg room than its big brothers, the Ambassador and Statesman. This is a nice small car but definitely not the correct rig for a guy with twelve kids and three dogs.

The next car I drove was the Ambassador 4-door sedan with overdrive. I tested this job two years ago and since then a new tail line has been added by drawing out the rear fenders. No longer does the Nash rear remind you of a plucked chicken in a Chinese butcher's window. Actually, the rear deck line is the same as before and if I were George Mason, Nash's prexy, I'd say to Farina, my new designer, "Start here, pal, and don't spare the ax." The rear window arrangements in both the Statesman and Ambassador make backing up a major feat as they are almost impossible to see out of.

There have been a few other minor changes, such as new manifolding, in the Ambassador since I tested it with overdrive so new time checks were in order. Zero to 60 now takes 15.3 seconds, which is fast. I have never been able to make top speed checks at the Nash proving ground because the track is too slow and there are no appropriate roads in the vicinity. Nash publicity men will tell you "way over a hundred" very glibly but the guys with the know-how, the engineers, feel that with all conditions right, 96 to 98 is about tops (yes, I'm thinking of that 95-plus for 712 miles) over the highway. Incidentally, these same engineers will tell you the Nash-Healey will do better than 120 and I'll buy this. It averaged 87 for 24 hours at Le Mans with some pretty hard turns involved, in the eight and a half-mile circuit.

[*Continued on page* 168]

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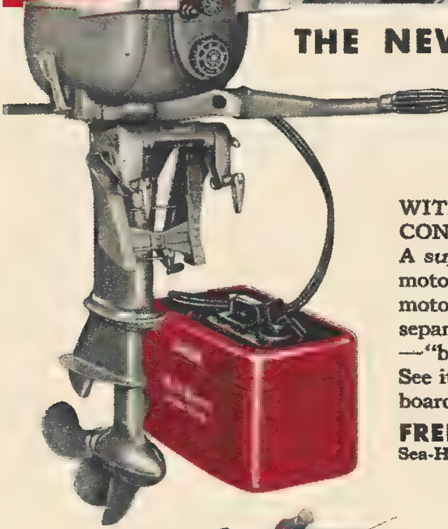

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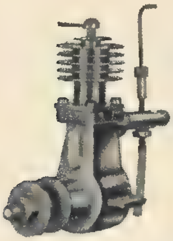

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McCahill Drives Nashes

[*Continued from page* 166]

Nash still features mobile flophouse characteristics, meaning that with a few turns of the wrist you have a double bed and screened windows. We have written this up so many times, even showing me in bed with my dog Joe, that I can only say it's still an A-1 wrinkle and very handy on many occasions.

It was getting dark when I got around to the Statesman so after a few turns on the track I called it quits and headed for home without making any time checks on this model. These Nash cars are good automobiles at today's prices and the boys who build them know what they are doing. •

SPECIFICATIONS

MODEL TESTED:
1951 Nash Rambler station wagon

ENGINE:
6 cylinder, L-head; bore 3⅛ inches; stroke 3¾ inches; maximum torque 138 foot pounds @ 1600 rpm; brake horsepower 82 @ 3800 rpm; compression ratio 7.25 to 1

DIMENSIONS:
Wheelbase 100 inches; overall length 176 inches; tread 53¼ inches front, 53 rear; width 73½ inches; height 59½ inches; weight 2430 pounds; standard tire size 5.90x15; gas tank 20 gals.

PERFORMANCE:
0 to 30 mph, 4.4 seconds
0 to 50 mph, 11.7 seconds
0 to 60 mph, 16.9 seconds
0 to 70 mph, 26.0 seconds
30 to 50 mph, 8.4 seconds (in high only)
30 to 60 mph, 13.0 seconds

Top speed, 82-85 mph

SPEEDOMETER ERROR:
At 60 mph on speedometer, actual speed 58.82 mph

SPECIFICATIONS

MODEL TESTED:
1951 Nash Ambassador 4-door sedan with overdrive

ENGINE:
6 cylinder, OHV; bore 3⅜ inches; stroke 4⅜ inches; maximum torque 210 foot pounds @ 1600 rpm; brake horsepower 115 @ 3400 rpm; compression ratio 7.3 to 1

DIMENSIONS:
Wheelbase 121 inches; overall length 211 inches; tread 54 11/16 inches front, 60½ rear; width 77½ inches; height 63½ inches; weight 3445 pounds; standard tire size 7.10x15; gas tank 20 gals.

PERFORMANCE:
0 to 30 mph, 5.1 seconds
0 to 50 mph, 10.6 seconds
0 to 60 mph, 15.3 seconds
0 to 70 mph, 19.9 seconds
30 to 60 mph, 10.0 seconds

Top speed, 96-98 mph (estimated)

SPEEDOMETER ERROR:
At 60 mph on speedometer, actual speed 61.64 mph

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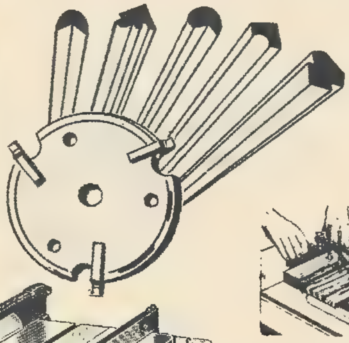

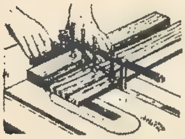

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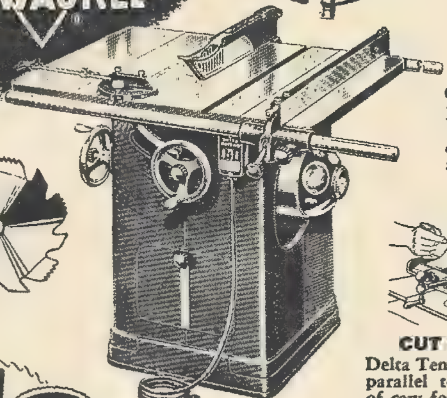
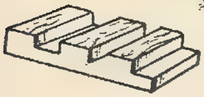
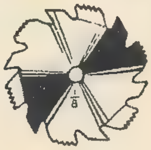
Exclusive Delta clamp attachment No. 865 on miter gage holds odd-shaped pieces firmly, safely and accurately!

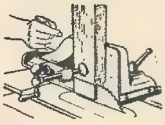






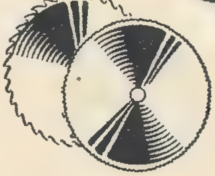
DADO CUTS UNLIMITED

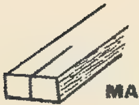
Delta's No 333 Dado Set will straight dado, gain, plough, rabbet, groove, spline cut and do all jobs with and across the wood grain!



CUT TENONS ACCURATELY

Delta Tenoner No. 1172 safely cuts square, parallel tenons in sizes to full capacity of saw for furniture, storm sash, screens, doors, etc.





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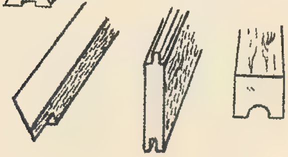

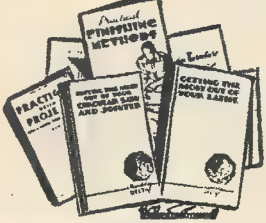
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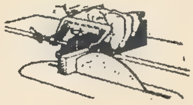

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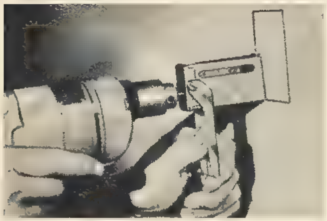

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Aggressor Training

[*Continued from page* 71]

"Lieutenant" Hyatt replied that he couldn't direct them but he could show them "this." Whereupon he hauled out his .45 and ordered them out of the jeep. Then he went on to accomplish his destructive mission.

As a faint indication of how large Exercise Portrex was, its techniques of assault and defense were observed and assessed by a team of 1,800 Army, Navy and Marine umpires. With the development of the Aggressor, the role of the umpire has become vitally important. He not only stands back and watches the play of the opposing forces, but decides which side is victorious. However, who wins or loses is not the main consideration.

Next important war game was Exercise Swarmer, involving 60,000 men in the Fort Bragg, N. C., area. The unique mission was to demonstrate the wartime application of a mass airlift much like the Berlin operation. A gigantic airhead was established, supported and built up to breakout proportions, after which a sustained offensive was maintained by an aerial supply line for 11 days.

Swarmer pioneered in what could be the best overseas invasion method of tomorrow—use of air not only for the dropping of invasion troops, but for dropping enough supplies, weapons and reinforcements to support a full-scale ground operation. The Berlin airlift was a marvel in logistics but it was unhampered by resistance of enemy planes or artillery such as actual war would bring. Swarmer simulated such resistance and showed exactly how the Berlin technique must be revised to permit air cover and ground operations.

Within the last few months, an Aggressor Force invaded the Western Zone of Germany. In the process of repelling this sham invasion, our occupation forces learned much that may be of value in a real battle of this type.

Prospects for new major war games include another arctic maneuver in Alaska, a cold weather exercise in the United States, a mountain battle involving a regimental combat team and a parachute company, a jungle operation for streamlining the knowledge gained in World War II.

The importance of the Aggressor Force to our national security scarcely can be exaggerated. Virtually every fighting man engaged in air, sea and land operations in Korea participated in at least one large-scale Aggressor training exercise. Most of them engaged in at least two maneuvers.

So our valiant action there in the face of overwhelming odds proved that Uncle Sam's war against his private enemy really pays off in combat! •

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Listen to the CHAMPION ROLL CALL . . . Harry Wismer's fast sportscast every Friday night over the ABC network

Millions From A Twist

[*Continued from page* 63]

it was bought. Little girls get tired of seeing the same expression on their dolls' faces. They demand new ones and that means extra expense for Pop. So Miss Kalep came up with her idea for a faceless doll!

She calls it Scribbles and it's made of vinyl plastic throughout. Scribbles comes in a variety of costumes but with an utterly blank face. The twist? She provides crayons and tissues with each doll and the child or parent can draw in a new face anytime. The crayon marks can be removed from the plastic as easily as chalk from a blackboard.

Now peek into the backyard over there. See those children engrossed in a game of cards? No, it's not poker—not even canasta. They're having a grand time and learning things, too, with their new Ed-U-Cards. And that brings up the story of another twist.

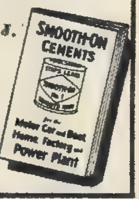
Irving Brambier, a Brooklyn advertising man, once noticed his three children trying to puzzle out a game of casino. It's an easy game, of course, but it still wasn't for kids. Idea: why not invent a card game specifically for children?

Brambier spent his evenings puzzling out the thought and in a short time he produced a deck of alphabetical cards and another one with fairy tales. He sank a couple of thousand dollars into a manufacturing venture and today he's producing 200,000 decks a month, not nearly enough for the demand. There are all kinds of games, including cowboys-and-Indians, baseball, numerical ones and a number of nursery stories. The cards are in great demand at such institutions as the Lexington School for the Deaf and many teachers' colleges. A twist gave Brambier a big business.

We're still kiddie-conscious. How about that gang of 'em in the park? They're having themselves a time with a toy which is rapidly becoming the hottest fad since the yo-yo. It's a twist, of course—a twist on the boomerang. Roger Hamilton of Rutherford, N. J., the inventor, calls it the Zoomerang and it's only a plastic compound coiled around a wooden handle which, when hurled with a casting motion, always comes back to the owner. The toy provides a bushel of fun for the youngsters and, incidentally, a bushelful of greenbacks for young Mr. Hamilton.

Let's stop here for a while, next to that group of mothers sunning their babies in carriages. Oops, we fell over another big idea. That is, young Marion Donovan did. She's the mother of three children in Sagutuck, Conn., and she very literally twisted a piece of cloth into a tidy little jackpot.

Whenever Mrs. D's youngest tot heralded



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the dawn with a wail for breakfast, his mother generally found him sopping—baby, pajamas and bed clothes. The rubber pants he wore over his diapers never worked very well. Mrs. Donovan, tired of the incessant dampness, decided to make her own diaper cover. She cut a piece from the waterproof shower curtain, then twisted and folded it until she had one that could be changed in a twinkling and which was completely seep-proof. She called it the Boater, went into business and now runs a thriving enterprise directly from her home.

Well, we'd better be heading home. Looks like we're going to be caught in a sudden shower. Gotta make a dash for the nearest doorway until it lets up.

And that's exactly what happened to Robert Burgess and his wife, Jane, when they went shopping in their home town of Gary, Ind., and got caught in a downpour. Why, thought Bob and Jane, couldn't they make some kind of throwaway umbrella to be sold from vending machines at department stores, depots, movie houses and the like? Just a paper thing for emergencies, something to be used only once, but enough to keep people dry until they got home?

It took them a whole year, at the end of which they had perfected a neat packet of accordion-pleated waterproof paper, 16½ inches long, and a wooden rod, 19 inches long. The paper could be unfolded into a circle and the rod inserted into a metal holder. Result: a Papersol. There are still technical problems to be solved in the vending but when they are ironed out Bob and Jane Burgess will remember that rainstorm as a golden shower from heaven.

Well, we're back home now. Convinced that the ideas for twists can be found anywhere and everywhere? Well, what are some of the standard inventions which can stand improving? Keep your eyes open as we take another stroll—only this time it will be through your own home.

Start at the kitchen because that's where so many products of the inventive mind today are angled. There's the potato peeler. Through the years dozens of different gadgets have been devised to ease the peeling of the lowly spud, but the really perfect instrument hasn't come to light yet. Have you got it?

How about the can opener? There are some honeys on the market but even they can stand a new twist. Look at the pots and pans—have you got any ideas on how they can be made more serviceable? Can the refrigerator be improved? Any ideas on the toaster, broiler, electric waffle iron, napkin holder?

Almost everything you see in your own home can be improved upon—everything can

[*Continued on page* 175]

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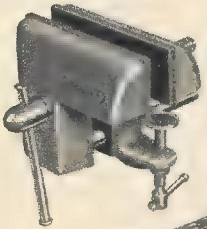

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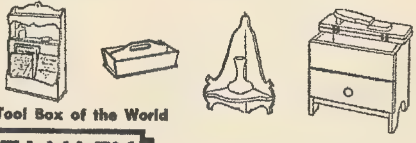

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A Ceramic Kiln

[Continued from page 112]

The bricks are laid on the hexagon pattern so that they form alternate sides, then another brick is placed on top of the other two in such a way that it forms the intervening side. The portion where the top brick overlaps those underneath is then marked with a pencil. The marked brick is placed in a vise and the designated portion is sawed out with a back saw.

These bricks can easily be cut with a hand saw. When six bricks are cut, they are fitted together to make a hexagon. The pieces cut off the ends can be used to fill up the center opening and will make a complete layer. Construct the second layer as indicated.

The walls of the kiln are made of six bricks stood on edge, with the corners mitred at 60° angles so that when they are placed together they form a perfect hexagon. It is necessary to cut a slot for the element in each brick. This can be made by clamping the brick in a vise and making two straight cuts along the center with a back saw. The cuts should be ¾ in. apart and ½ in. deep. The portion between the cuts is then gouged out with a chisel. The channel cut this way can then be widened at the base with a rasp. If you have access to a milling machine, a better way to cut this slot is with a milling cutter. At the University of New Hampshire Experimental Station, where a number of electric kilns have been built, a simple tool was devised for this purpose by grinding the point off of a ¾-in. wood bit and brazing a piece of steel 3/16 in. thick, ½ in. wide, and 1¼ in. long to the bottom. This special tool can be placed in a drill press and rotated while bricks are pushed against it. A block clamped to the table guides the bricks under the rotating bit.

The elements for this kiln are made of six pieces of Kanthal A-1 ribbon, 2 ft. 8 in. long bent into zigzag shape and slid into the brick slots. Kanthal will bend when it is new but once it has been heated, it becomes extremely brittle and no change can be made in its shape. It would be possible to make the element for this kiln out of one piece of wire 16 ft. long, but it is easier to wire each brick separately. When bent to shape the ribbon is inserted in the brick slot. Two holes ⅛ in. in diameter are bored through each brick at the ends of the slot and two ⅛x3-in. bolts are used as binding posts. Thus each brick with its element becomes a separate unit. The units are connected with loops of wire on the outside of the kiln.

Next the roof. For extra strength and to prevent loss of heat through cracks, the bricks

[Continued on page 176]

Millions From A Twist

[Continued from page 173]

be twisted to create a newer, simpler product. That holds true for industry, too. Fred C. Crawford, president of the Thompson Products Company of Cleveland, tells how a little twist solved a 40-year problem. For that many years his firm had been spending a million dollars each year trying to make a better valve for automobiles. But the valves, constantly exposed to flame, always burned.

Then one day an engineer said: "Let's try a new approach. Valves burn because they stick open. When the stopper in a bottle sticks, what do you do? Twist it! So let's twist the valve."

The company made a tiny gadget on a string. Every time the valve popped it got a little twist. This new approach solved the problem once and for all. Literally, a twist did it.

So, if you've got an inventive mind and an observant eye, maybe you can do it too. Keep constantly on the alert for twists and you'll never be caught asleep at the million-dollar switch! •

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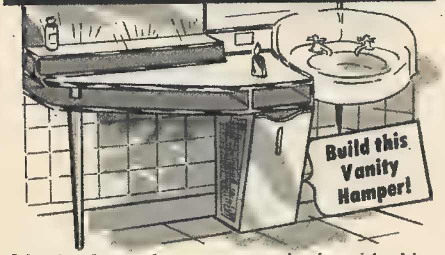
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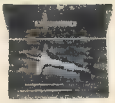
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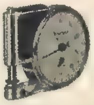
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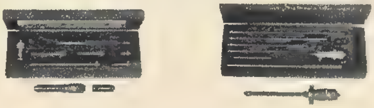
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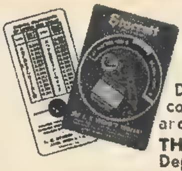

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Toys, Dishes, Books, Furniture

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CLEAR · FLEXIBLE

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Take BELSAW Portable Sawmill right to the trees—turn out valuable lumber for local yards—do "custom sawing" for neighbors. BELSAW lasts a lifetime. No crew needed. Power with old auto engine. Beginners get excellent results. Send postcard for FREE BOOK, "How To Make Lumber."

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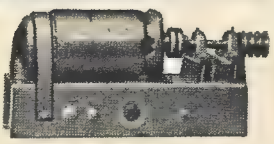
COMPARE THIS !! $39.95
300 AMP.-D.C.-WELDER KIT
ASSEMBLE YOUR OWN — SAVE HALF!

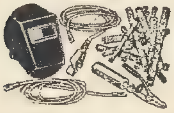
NEVER BEFORE AT SUCH AN UNBELIEVABLE LOW PRICE!



Now you can make your own welder using any aircraft generator and save many dollars. Only a pair of pliers and a few minutes are needed to assemble this kit into a sturdy welder giving you many years of useful service. Satisfaction guaranteed.

HERE'S WHAT YOU GET: No. AW5-Kit includes Special Hook-up Leads, Amperage control with leads, Mounting Plate, Pillow Bearings, Bearing Supports, Shaft Extension, Flexible Coupling splined to fit your generator, Triple Groove "B" Type Pulley. Plan included. No. AW5-Kit Complete **$39.95**
No. AW6 Includes AW5-Kit above plus Arc Stabilizer........ **$49.95**
No. AW7 Includes AW6-Kit above plus R-1-300 Amp. Generator **$67.90**
(R-1 Generator Cost Gov't. approx. $400.00.)

EXTRA! A **$15.95** Accessory Kit Complete for only **$12.95**! Includes Welding Helmet, Electrode Holder, 5 lbs. Ass't. Rods, Two 10 ft. Welding Leads with Terminals and ground clips, plus Audel's Welding Guide. **Sold with any Welder Kit . . . Special Price........$12.95**



PLANS 35c LeJay's proven plan for building your own Welder using aircraft generator. Catalog included.

Order Direct from This Ad

FREE! Big New Catalog of Electrical Bargains—Write for It!

LEJAY MFG. CO. 914 LEJAY BUILDING
MINNEAPOLIS 8, MINN.

A Ceramic Kiln

[*Continued from page* 174]

forming the roof are put together with tongue and groove joints. The grooves are formed by making straight cuts with a back saw and then gouging out the portion between with a chisel. The tongues are also cut with the saw.

The roof must be lifted off and on, so baling wire is used to tie the bricks together. Metal guards cut from tin cans are placed at the corners to keep the wire from cutting into the bricks. This makes the roof a strong unit which can be easily moved. The bricks forming the wall can be wired together in similar fashion and so can each of the two layers of the base, but it is not necessary—the kiln will work just as well if the wall and the base sections are merely placed tightly together.

Bore a hole ½ in. in diameter through one of the wall bricks. This serves as a spy hole through which you can watch the cones during the kiln firing. A plug for the spy hole is whittled out of one of the brick scraps.

The photo at the bottom of pg. 112 shows the completed kiln ready for firing. It has inner walls 6 in. on each side and 4½ in. high and contains about 420 cubic inches. There are certain advantages to this shape since it is well suited to most pottery forms, and the fact that the elements go around all sides enables even distribution of heat.

This kiln can be plugged into a 110-volt circuit fused for 25 amperes, but there should be no other electrical equipment on the line. It can reach a temperature of 2000° in about six hours.

Two words of caution. Even though the floor is made of two layers of brick there will be a lot of heat seeping through. The kiln should stand on some fireproof material such as a slab of slate. For additional safety the slab should also be supported on bricks.

The second word of caution concerns the elements. As we said before, Kanthal becomes extremely brittle after it has been heated. Therefore see that the elements are securely fastened to the binding posts and that the binding posts are securely fastened to the bricks. Any movement here is liable to break the element. •

BUILD BATTERY MATE

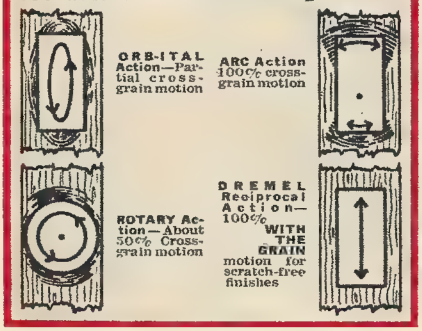
Using a battery-powered outboard motor, this handsome model really performs beautifully. Construction is mostly of balsa, with plywood added where extra strength is required. For your copy of these complete, full size plans, remit 50 cents to MECHANIX ILLUSTRATED Plans Service, Fawcett Bldg., Greenwich, Conn. Please specify Plan No. 420.

CHOOSE THE MODEL BEST FOR YOU!

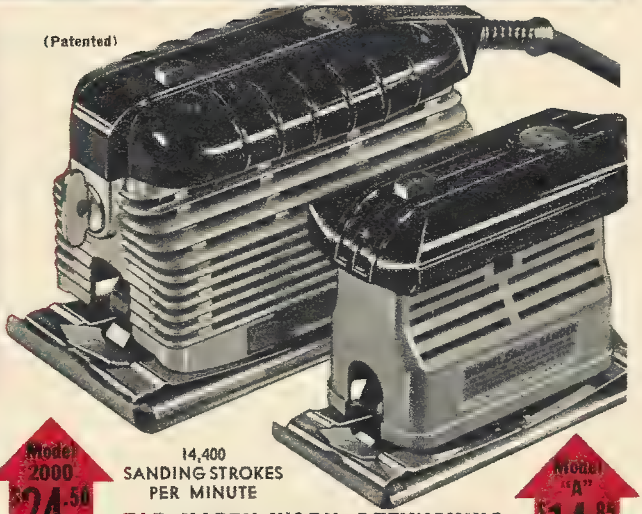
Two DREMEL Electric SANDERS with

STRAIGHT LINE Action for Guaranteed SCRATCH-FREE Surfaces

BEFORE YOU BUY ANY SANDER—BE SURE YOU WILL GET A SCRATCH-FREE FINISH


ORB-ITAL Action—Partial cross-grain motion
ARC Action 100% cross-grain motion
ROTARY Action—About 50% Cross-grain motion
DREMEL Reciprocal Action—100% WITH THE GRAIN motion for scratch-free finishes

(Patented)



14,400 SANDING STROKES PER MINUTE

Other Dremel Features (In both Model "A" and Model 2000)

Only 2 moving parts • requires no oiling • dust-proof • cam-type holder permits paper change in seconds • 8 ft. cord . . . operates on 110-120 v. 60 cycle, A. C. . . . fully guaranteed.

Model 2000 $24.50

FOR HEAVY-DUTY CRAFT AND WOOD WORKING PROJECTS

The new Model 2000 is a fast-cutting production sander. It has the added stroke and power required for furniture and cabinet making, boat building or refinishing, resurfacing large area table-tops, sanding plastic, leather, etc. Great for building operations in sanding woodwork, stair treads, dry wall joints, siding and other exterior surfaces. Does a superb wax polishing job, too! Weighs only 5 lbs. yet has 21 sq. in. sanding surface. Over-all size 3⅛"x4½"x7". Model 2000 price includes steel carrying case shown, with 25 assorted sheets abrasive paper and 1 sheepskin polishing pad.

IMPORTANT

Dremel tools are synonymous with quality. Compare them feature for feature with all competitive products. We don't want you to buy Dremel tools unless they are superior in every way.

Model "A" $14.85

FOR HOBBY WORK, REFINISHING AND REDECORATING . . .

Dremel Model "A" Sander saves time and labor for hobbyists, homeowners and housewives. *Over a quarter million now in use* for sanding woodwork, cabinets, wood and plastic models, unfinished furniture, workshop projects, etc. Easy to handle—weighs only 2½ lbs. Takes all the drudgery out of polishing any waxed surface. Sanding pad 2¼"x5½". Furnished with 6 sheets sandpaper, 1 sheepskin, 1 felt pad.

FUN FOR BOYS FROM 8 TO 80

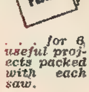
DREMEL Electric COPING SAW

CUTS SCROLLS LIKE MAGIC—SANDS AS IT SAWS

BLADE FACES 4 WAYS

Only $5.85 with 3 saw blades

JUST GUIDE IT!



. . . *for 6 useful projects packed with each saw.*

SAFE! AS A HANDSAW

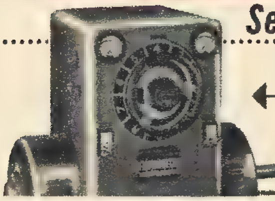
For home, hobby, repair work—no other tool pleases so much for so little cost. Works in any direction—delivers 7,200 strokes per minute smoothly, effortlessly, Saws through ¾" medium- hard wood at a foot-a-minute speed. Touch-of-the-trigger, foolproof action. Only 2 moving parts, never needs oiling. Uses 110-120 v. A.C.

WHERE TO BUY DREMEL TOOLS

Dremel Tools are sold everywhere. If your dealer cannot supply you, send remittance in full and we will ship postpaid. Or send only $2, and pay postman balance plus postage and C.O.D. fee. *Money back if not delighted after 5 days' trial.*

DREMEL MFG. CO. Dept. 111-B RACINE, WIS.

Set Up Your Own Welding Business—Save $300 to $500



"Build Your Own" big capacity arc welder and save! This HOBART generator plus your own hook-up builds a welder that will earn hundreds of extra dollars for you.

Get Into Big Profits on Repair and Contract Work

Let Hobart help you "build your own" welder and save $300 to $500 over cost of factory-built unit. Select the type and capacity generator you want from our complete line and belt or couple to a good used auto engine. Don't miss this opportunity. Write for FREE booklet.

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CROSLEY

You have to drive a '51 Crosley to know the car as it is today. Bigger, sturdier, heavier. Powerful engine with 7.8:1 compression ratio, hundreds of mechanical improvements. New interior and exterior features and styling. Crosley gives you 35 to 50 miles per gallon. And Crosley is still the only new car you can buy for less than $1,000. Lowest price, lowest down payment, lowest monthly terms. So see your dealer—test drive the new 1951 Crosley—the most improved car!

FREE! 1951 Crosley Catalog! Write Crosley Motors, Inc., 2530 NY Spring Grove Ave., Cincinnati 14, Ohio.

CROSLEY a FINE car "You see them everywhere"

Central Heating

This electric radiator operates in AC or DC, has thermostatic control range of from 40° to 110°. Mounted on casters, it can be shifted easily from room to room.

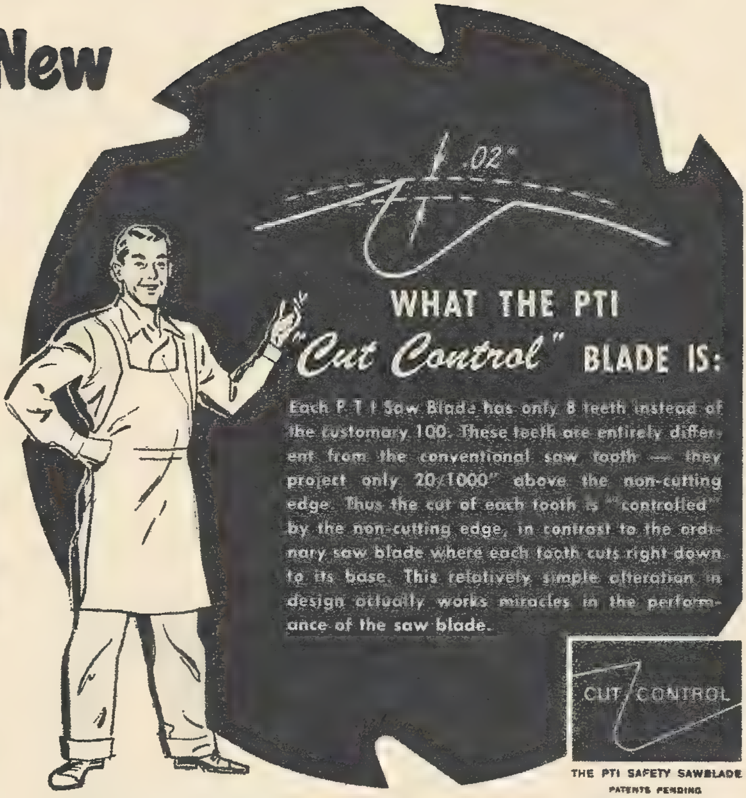
[*Continued from page* 132]

up, the air is discharged through the top of the frame and reflected outward by the aluminum backing. Though the heaters give off no light (and thus don't waste any energy in unwanted illumination) the radiant portion of the heat they generate resembles sunlight in some ways. Radiant heat has the characteristic of heating people and objects in the room first, the air last. Thus you can turn the heater on and be warm within five minutes. It's said that 65° of radiant warmth will keep you as comfortable as 70° of convective heat. Glass heating panels are made to accommodate the range of from 115 to 245 volts, AC or DC.

Standard units draw 1,000 watts. The bathroom type takes 625 watts and a baseboard panel requires 450 watts. The 115-volt models are intended chiefly for auxiliary heating. For installation in buildings with no other heating plant you should install the 220-volt type. All models are available in either recessed

[*Continued on page* 180]

Amazing New SAFETY SAW BLADE



WHAT THE PTI "Cut Control" BLADE IS:

Each P T I Saw Blade has only 8 teeth instead of the customary 100. These teeth are entirely different from the conventional saw tooth — they project only 20/1000" above the non-cutting edge. Thus the cut of each tooth is "controlled" by the non-cutting edge, in contrast to the ordinary saw blade where each tooth cuts right down to its base. This relatively simple alteration in design actually works miracles in the performance of the saw blade.

THE PTI SAFETY SAWBLADE
PATENTS PENDING

Embodying a radically new cutting principle

Here is the greatest improvement in circular sawing — since the invention of the circular saw. It's the sensational new *P T I Cut Control* Saw Blade that brings long-needed safety and remarkable *new* efficiency to this important power tool. Never before has a saw blade been subjected to such gruelling, thorough tests, to such careful checking and re-checking by leading laboratories, government agencies, universities, and industrial concerns. And never before has a saw blade made such astounding records in safety and cutting efficiency. No other saw blade today can offer you so many exclusive advantages, including:

1. **Complete Safety From "Kick-Backs"** — Since the teeth are only 20/1000" high — they cannot grab the wood and throw it against the operator — eliminating one of the most serious causes of circular saw injuries.
2. **Reduced Direct Injuries** — Cut Control teeth do not drag the hand into the saw. The non-cutting edge acts as an effective stop to cuts and limits their depth.
3. **Cuts Chips — Not Sawdust** — unique cutting action produces chips. Easier to clean. Eliminates fire hazard of spontaneous combustion.
4. **30% to 40% Power Saving** — Fewer teeth mean fewer cuts to achieve same results — hence less power consumption.
5. **Longer Life Without Sharpening** — When cutting off chips — the wedge action of the tooth does most of the work — which means less wear on the cutting edge of the teeth.
6. **More Efficient Cutting** — Each tooth is backed up better against body of blade. It is therefore more rigid, less likely to vibrate — and cuts more smoothly.
7. **Quieter Running** — Fewer teeth makes saw practically noiseless when running true.
8. **Blade Does Not Crack** — blades are made of special Vanadium Steel. In addition — controlling of cut prevents overloading of teeth, a common cause of blade cracking.

ORDER TODAY —
SATISFACTION GUARANTEED!

Here are the prices and sizes, delivered, postpaid. All blades are combination rip and cross cut.

7" diameter blade	$4.95
8" diameter blade	5.90
10" diameter blade	7.50
12" diameter blade	9.40
14" diameter blade	11.40
16" diameter blade	14.40

(Prices on carbide tipped blades furnished on request.) In ordering, be sure to give the *diameter* and *bore* of the blade. Send check or money order or we will ship C.O.D. *Satisfaction or money back guaranteed.*

TESTED AND APPROVED

Actual letters from delighted users in America and Europe crowd our files. Excerpts from letters include:

"Your claims are confirmed by our tests. Power reduced by about ⅓. No heating of blade in spite of very exacting work. Confirm your observations regarding kick-back safety. Saw offers considerable advantages."

"Blade used on portable saw. Has properties like no other saw blade. Work is easier, faster and free of kick-backs. Less noise. Less power required."

"This saw was installed in February of this year on a G. M. Diehl Chain Feed Rip Saw and has had a total of 2,037 operating hours. During its entire operation the saw has produced a quality cut suitable for edge gluing."

PTI

PTI Incorporated, Dept. MI-2
401 Broadway, New York 13, N. Y.
Gentlemen: Rush me the following units:

Quantity	Blade Diameter	Blade Bore

Please check:
☐ Money order or check for $.............. ☐ Send C.O.D.
Name ....
Address ....
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8
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WHY IT'S
YOUR BEST BUY

Snap-on* BENCH GRINDER

- Completely enclosed motor.
- Oversize ball bearings throughout.
- Large wheel guards.
- Rugged base. Rubber feet provide solid mounting free from vibration.
- Induction run motor develops less heat in winding.
- Adjustable tool rests.
- Capacitor start motor — uses low starting current.
- Many special models are available for use with different voltages and currents.

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ALL NEW 1951 KING MIDGET AUTO

World's Lowest Priced 2 Passenger Car

Drive it for 75c per week. Amazing performance. Surprising comfort. All steel construction. Full accessories, top and heater. Ready to run or assemble it with our bolt together parts. Rider agents wanted. earn your car Free. Send 25c for detailed literature or $1 (refunded first order) for actual assembly book and service manual filled with photos, drawings, specifications, etc.

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EVERY ELECTRIC DRILL A PORTABLE SAW

9.95 with 4" "HYCARBON" Crosscut Blade

At Better Hardware Stores Everywhere

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'ARCO SAW'

Can Be Used With One Hand!
Any 1/4" or 3/8" Drill a Powerful Saw in ONE MINUTE

"ARCO-SAW" is a rugged tool with right angle gear drive (no clumsy, dangerous. direct drive with drill sideways.) Works like a high priced Portable Saw.

CUTS 1-5/16", or 2x4 by turning over

ONLY *ARCO* GIVES YOU ALL THESE FEATURES: Safety-yoke assures rigid connection and absolute safety—Big handle affords firm grip for two-hand operation—Precision one-piece gear box—Self-lubricating lifetime bearings—Visual guide and wide shoe-plate for straight, square cuts—Lowest priced, quality Replacement Blades.

"HYCARBON" 4" Crosscut or 4" Combination Blade......$2.00 ea.

90-day Factory Guarantee

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UNCONDITIONAL 10-DAY MONEY BACK GUARANTEE

DEALERS—Write for nearest jobber.

ARROW METAL PRODUCTS CO.
DEPT. MI-2, 140 WEST BROADWAY, NEW YORK 13, N. Y.

Central Heating

[*Continued from page* 178]

or surface fixtures. Radiant glass panels will operate as soon as they are plugged into an electric outlet, but they are used most efficiently in new buildings in which electric wiring is laid out according to plan. The cautions about line loading mentioned above must, of course, be observed. It is also imperative to install thermostats that will control each room individually. These should be located at some distance from the heaters, and the entire circuit should be completely separate from the rest of the wiring.

Each 1,000-watt radiant fixture will heat about 1,000 cubic feet. Thus an average room would need one heater, and large living rooms might require two. At the going price of about $60 per unit, equipment for a six-room house would cost roughly $360. Installation costs vary, but you can be sure that it will be considerably less than putting in a steam heat system.

Part of the calculation must include the cost of electricity. It has been estimated that electricity for heating these glass panels at 2 cents per kilowatt hour will run you about the same as fuel oil at 12½ cents a gallon—provided, of course, that your home is well insulated.

Cost thus appears to be moderate, but if electric room heaters eventually replace central heating, it won't be because of price alone. Long ago central heating became popular because people found it easier to build a fire in one furnace rather than in a dozen fireplaces. Electricity builds its fires at the touch of a switch, then automatically regulates them to your taste. It gives you warmth when you want it, where you want it, and just the way you want it. For convenience and comfort, that's a hard combination to beat. •

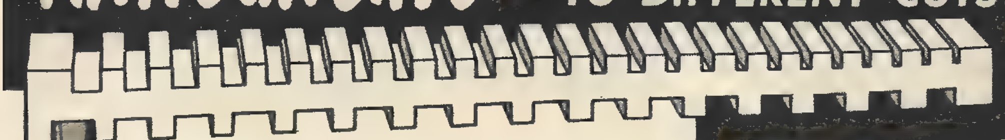
Custom Sewing Kit

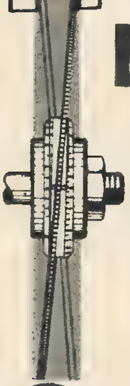
[*Continued from page* 109]

dowel are glued into holes six to a shelf and on three shelves. When the rack is folded closed the spools are locked in. With the rack open the spools can be speedily lifted off the pegs. Two blocks of ¼ in. hardwood are glued to the under side of the rack's bottom shelf. The rack is hinged to the inner side of the lid by hinges on the blocks which provide clearance for lower side of rack.

A small turn-button of hoop brass on an escutcheon pin driven into the front edge of the top shelf engages a second piece which is bent to form a flat hook and fastened to the top of the box. •

ANNOUNCING NOT ONE—NOT 12—BUT 40 DIFFERENT CUTS!





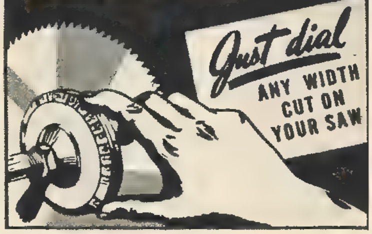
NEW Warren

DADO SAWING WASHERS

Multiply the uses of your circular saw with sensationally improved Warren Dado Sawing Washers! Make smooth, parallel dados or grooves in *40 different widths* with your present saw blade! Dial the width with Micromatic adjustment—in 15 seconds you're making the cut. Four simple washers—precision-made in matched sets—no vibration, no gadgets to get out of alignment. No burning, chewing—no sanding. Four sizes ½", ⅝", ¾", 1"—fit all popular saw arbors. See your dealer or send coupon today—ABSOLUTELY GUARANTEED!

ONLY $4.95 per set

NO INCREASE IN PRICE!


Just dial
ANY WIDTH CUT ON YOUR SAW

WARREN DADO SAWING WASHERS CO., Dept. 222
70 Medbury, Detroit 2, Mich.

Enclosed (check or M.O.) $4.95 for one set of NEW Warren Washers. My arbor size is ☐½" ☐⅝" ☐¾" ☐1". ☐ Send free booklet.

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NOW—IT'S EASY TO GIVE YOUR CAR THIS DISTINCTIVE LUXURIOUS CUSTOM STYLING
—And Many More Outstanding Features
NEW Continental
Custom Rear Conversion—for Ford, Mercury, Chevrolet, Plymouth

What a sensation! With a new *Continental* Custom Rear Conversion, your car looks longer and wider . . . takes on sweeping style lines and a continental air that's really luxurious. When mounted, it becomes an integral part of the body for greater protection of rear fenders, deck and body. Carefully engineered weight distribution improves balance; assures safer, smoother driving in any weather. Removal of spare wheel from trunk increases usable luggage space more than 25%. Tire is safety-locked on patented hinged bracket that swings up or down with finger-tip control. From every angle the *Continental* is a winner . . . and moderately priced. Ask your car dealer or write . . .

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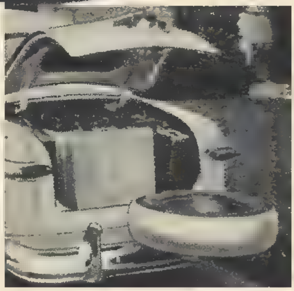
SAN FRANCISCO 9, CALIF.



LOCKS onto the work
"HOLDS ON," after you let go!

AFFORDS A FIRM GRIP ON SHORT ENDS
REMOVES STUBBORN STUDS AND THEN RESETS THEM
SEYMOUR SMITH SNAP LOCK PLIER WRENCH

Finest locking plier because...

Clamps on better with patented swivel jaw which adapts itself to shape being held. Faster working because of patented jaw size indicator; you pre-set jaw size to approximate size of object. Easier opening with patented lock release; finger-operated lever readily releases 2000 pound bite.

$1.95 7" size
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Both bright nickel finish

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BRAND NEW **30 DAY FREE TRIAL**
7x50 *Prism* BINOCULARS

7 x 50
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Finest Precision Optics
Lightweight Aluminum Bodies
Money Back Guarantee
Many other Models
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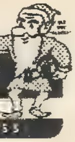
You also get a full size bottle of Rogers famous Gorilla Grip glue—all for only 10c! Your furniture will last a lifetime with Rogers. It has a ton of strength in every drop. Ask for Rogers at your local Hardware Store.

Don't miss this great offer! Send 10c today to Rogers Isinglass and Glue Company, Gloucester, Mass.



The Glue With the Grip of a Gorilla
ROGERS
the best LIQUID FISH GLUE
GLOUCESTER, MASS

Double Duty Drill Stand

[*Continued from page* 113]

altered to fit your own drill housing if necessary.

Begin by making the post and slide rods. The 2-in. angle iron is cut and the rods fastened to it with 6-32 machine screws. After final assembly and alignment, these rods are brazed in place.

When purchasing the awning slides specify ½-in. bore and threaded pins. Bushings are cut from standard weight copper pipe and pressed into the slides. Filing of rough spots in the slide bores will be necessary. The pipe has a ½-in. outside diameter and a ⅜-in. inside diameter, and therefore gives a good sliding fit on the rods.

The lever fulcrum is next bolted or brazed to the post with the pin hole center line at right angles to a line bisecting the post angle. This fulcrum is shaped from an awning pad eye. One pin hole is drilled out ⅜-in., the other is tapped ⅜-24. The lever pin is a ⅜-24 bolt with the head cut off and the shank slotted for a screwdriver. Be sure the hole in the lever bears on the shank, rather than the threads, of the pin. The dimension between the fulcrum hole and the link hole on the lever and the length of the link must be accurate to insure full travel and free operation of the drill. The pin holes of the clevis are drilled and the shank holes tapped for a ⅜-in. stud to connect them.

If an I-beam is unobtainable, the holder assembly can be made by riveting four pieces of 1¼-in. angle iron to a 6x2½x⅛-in. plate. A nut is brazed over the thumbscrew hole in the rear support, as frequent use of the thumbscrew would soon wear out threads tapped in the comparatively thin angle iron.

The drill post is supported by four angle iron brackets, assembly being made with ¼-20 stove bolts. The base plate is 8x10x¼-in. sheet iron securely fastened to a steady workbench top.

Drill travel is an ample 5 in. To dispense with return spring arrangements, friction in the linkage is used to hold the drill in any position. Bolts are used for link pins and are carefully fitted. Plate washers are inserted between the link and lever to eliminate side play and to provide friction. •

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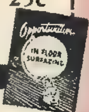

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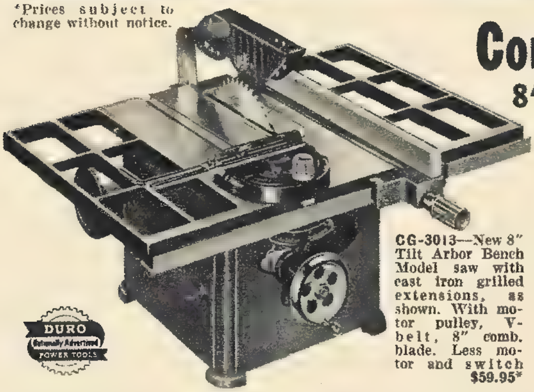

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$52.95*

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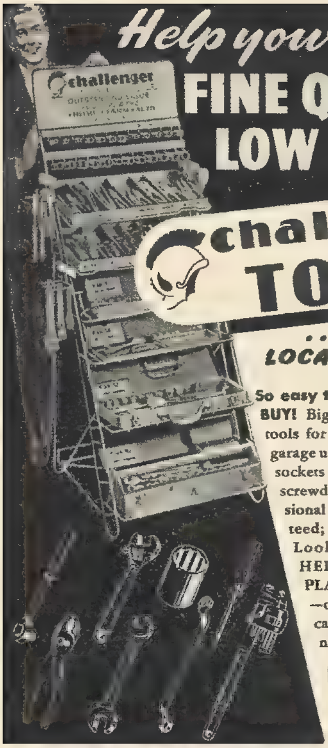

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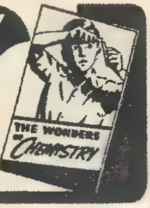

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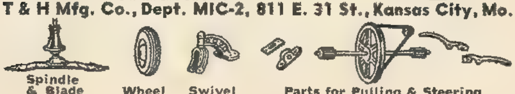

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AMBROID CO.
302 Franklin St., Boston 10, Mass.

Shop Vacuum

[Continued from page 154]

into the underside along the rim will keep the cover in its proper position.

Cut two holes in the top. One should be the diameter of the intake aperture of the old vacuum's fan housing. The other should take whatever cleaner-hose attachments you use (probably a 1¾-in. diameter). Mount the vacuum motor and fan over the large hole, fastening it with bolts or screws through the holes where the sweeper mouth was attached. Glue the cork gasket to the top with linoleum cement. Unless you happen to be handy with a sewing machine, let your wife or an upholsterer cut and re-sew the dust bag to fit whatever type of closure will clamp the cleanout end.

As for the base, lap-joint the 2x2's as shown. Drill holes near the ends to take the caster shaft housings. Place the can in position on the base, mark where it touches, and cut ¼-in. dadoes into which the bottom lip of the can will rest.

Finally, bend spikes into S-hooks, cut off their heads, and drill blind holes for them to fit snugly into the top, locating a hole directly above each of the four base ends. The heavy elastic bands cut from an old inner tube will stretch from the base ends up to the hooks, holding top, can and base tightly together.

Cleaning the machine is simple: remove the dust bag and shake. Then slip off the hooks and bands, lift off the top, and cart the can off to dump the heavier waste. •

Desk Lamp Projects

[Continued from page 117]

piece for holding two small pots. I would suggest that the alternative be used and one pot mounted lower than the other. A similar arrangement can be used except that the holders are reversed and mounted individually. In this project you will have to remove the simi-circular pieces from the round connection that joins them. This may be a threaded joint or it may be soldered. If the latter is the case use a hack saw to separate them. Fasten the cut ends in the top wood piece by using a very tight press fit. This will be strong enough to hold a small pot. However you can use a set screw and cover up the hold with plastic wood.

The lamp can revert to its original purpose now as a wall unit. In this case use the half of the lamp with the wire through it. You need only to attach the shade and mount it on a base to get an attractive wall lamp. •

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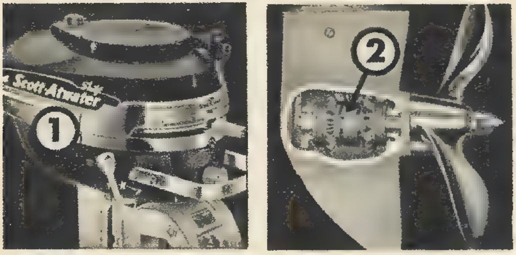

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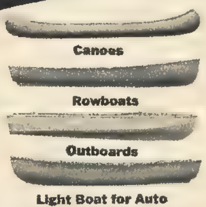

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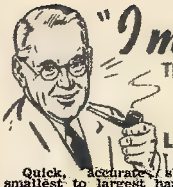

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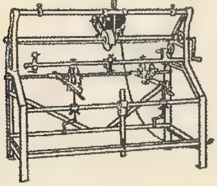

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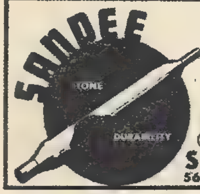

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$39.50 AND UP!

I Raise Cats Under Water

[*Continued from page 73*]

best weight. The females will lay 15-25,000 eggs in a batch.

Always choose channel cat males a little larger than the females for the male hatches the eggs. If he were smaller than the female she would fight him off and eat the eggs. Place a nail keg or a ten-gallon milk can in the deepest water of each pen. The fish deposit their eggs in these. Brooders will improve with age and tameness, many spawning up to ten years of age.

We now have 300 brooders weighing 4 to 16 pounds each to which we feed 200 pounds of chopped horse or carp meat once a week. That and the natural feed in the ponds completes their diet.

Interestingly enough, growing catfish soon learn to know their friends, recognize familiar footsteps and can be called like chickens by banging a feed can. At the approach of strangers they come to the surface warily.

Getting spiked by the spines of a big catfish is a rather painful experience. Ernie Pockrus, my head fish man, has been spiked many times through the years. But he laughs when he tells about a time last Spring when he got his worst spiking.

"It happened like this. We run one pair of catfish brooders to a 5x7-foot pen. The water is three feet at the end and slants up to nothing on the grassy shore side. The bottom is mud and slick footing. A kid helping me had put an extra pair of big 16-pound catfish brooders into pen No. 12 and I didn't know until too late. I'm in there in the deep end reaching deep in the water for the steel egg can.

"Suddenly I move my foot and a cat spikes my ankle. I jump, lose my balance and fall over backwards into the shallow end. Man, I must have sat right down on all four catfish. And they were plenty mad. Three spikes stuck into my rear and I let out a yell.

"It wasn't fatal—but a catfish spine wound feels about like a bee sting increased in proportion and I was sore for several days. First thing I did was put a set of cleats on my soles."

Do we eat channel catfish? Man, and how! I'm from Texas, and we Southerners know good food—and good fish. Here's my recipe for cooking channel catfish; take nice meaty pieces, wash, dry, salt and pepper to taste. Roll in plenty of corn meal, then fry in deep hot fat until the pieces float golden brown. There you have eating fit for the gods. Yes, you'll wind up with a stomachful of fine fish and at the same time keep my pockets full of cash. •

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GIL-BILT 10-INCH TILTING ARBOR SAW
- 27x28 in. table, 13½ in. capacity in front of blade
- 10 in. blade cuts 3¼ in. deep, tilts full 45 degrees
- Floor model 34" high, table always stays level
- New Departure ball bearing arbor, ¾" precision shaft turned down for ⅝" bore blades, alum. housing, shipped ready to run
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- Cast aluminum miter gauge and self-aligning rip fence guide

GIL-BILT Metal Parts Kit includes Plans, ball bearing arbor, miter gauge and bar, rip fence guide, dado insert, lock knobs, jack screw mechanism and handwheel, and all other metal parts (less blade)..........$20.95
Same Kit with 10" Combination Blade..$24.90
Same Kit with 8" Combination Blade..$23.90

GIL-BILT 8-INCH TILTING TABLE SAW
- 21x27 in. table tilts full 45 degrees, 13 in. capacity in front of blade
- 8 in. blade cuts from 0 to 2½ inches
- New Departure ball bearing arbor, ⅝" precision shaft turned down for ½" bore blades, alum. housing, ready to run
- Cast aluminum miter gauge and self-align. rip fence guide (same as above)

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Same Kit with 8" Combination Blade..........$18.90

GIL-BILT 12-INCH BAND SAW
- Cuts to center of 24 inch circle
- Handles stock up to 6 inch thick
- 18x18 inch table tilts 45 degrees
- Lower wheel and drive pulley runs on sealed New Departure Ball Bearings; Upper wheel runs on two ⅜" bore Oilite Bronze bearings.
- Upper wheel tension and tilt mechanism of cast aluminum, completely assembled.
- Upper and lower blade guides. Each has ball thrust bearing, self-lub bronze jaws
- Rigid cast aluminum wheels fully machined ready-to-install. Heavy rubber tires.
- Uses standard 78 inch blades up to ⅜ in. wide.
- Fully enclosed mechanism for utmost safety.

GIL-BILT Metal Parts Kit includes Plans, rubber tires, aluminum wheels, ¼ in. blade, ball bearing spindle, tilt mechanism, blade guides, table tilt segments, and all other metal parts..........$20.95

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- Belt travels 1800 ft. per min. Over a MILE of straight sanding action every three minutes. Saves more "elbow grease" than any other tool.

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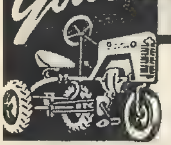

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Toughest Boat Race

[*Continued from page* 77]

get through Wind River Canyon. A canoe made of the finest aluminum buckled and sank before it was even started. And it's the same with government rubber rafts. They generally blow up before they get around the first corner. That is, unless they are bolstered in the floor with plywood to prevent cupping when the boat fills with water. Once a contestant went shooting down the rapids with only his head visible above the rim of the boat which, having swamped, had pulled downward causing the rim to be sucked in around his neck. He was yelling wildly for help but before anybody could reach him the boat blew up and released the terrified man.

The most scientifically constructed craft ever used on Wind River was designed and built by Bob Cole, 62-year-old Thermopolis blacksmith. In 1949 this boat, operated by Johnnie Wells, won first place in the record time of 1 hour 22 minutes and 4 seconds. Then in 1950, with Cole himself at the helm, it came through undamaged though it did not win.

Cole thinks that the reason his boat did not win a prize again was because of a gadget he placed on the front of it—a 12-inch sheet-iron apron designed to cut two feet off the waves that continually slam you in the face. He says that due to a hard wind which rose after the start of the race the apron became a hazard.

Only those who can pass a stiff medical examination are allowed to enter this race. There is always a physician or two along the way to give first aid, extra boats and cowboys who are adept with a lariat for rescue work. But even so, when a man gets into those rapids he is pretty much on his own.

Tom Sparks and Sonnie Reese once decided to take extra precautions by donning two lifesavers instead of one. When their rubber boat turned upside down with the two men underneath it, they were too buoyant to get from under the thing and went lurching downstream. People saw the boat passing by but no one dreamed that anyone was under it. Reese and Sparks were near suffocation when the boat finally turned back over.

Last year's winners, Blanton and Lynch, really earned their $1,000 purse. Blanton had two broken ribs and a bad ankle wound. Lynch was cut from head to foot and was exhausted almost to the point of shock. Both were in the hospital for over a week.

Some boating enthusiasts call this race the most difficult in America. But founder Jean Davis isn't willing to let it go at that. He insists that the Wind River White Water Race is the wildest and toughest race in the world! •

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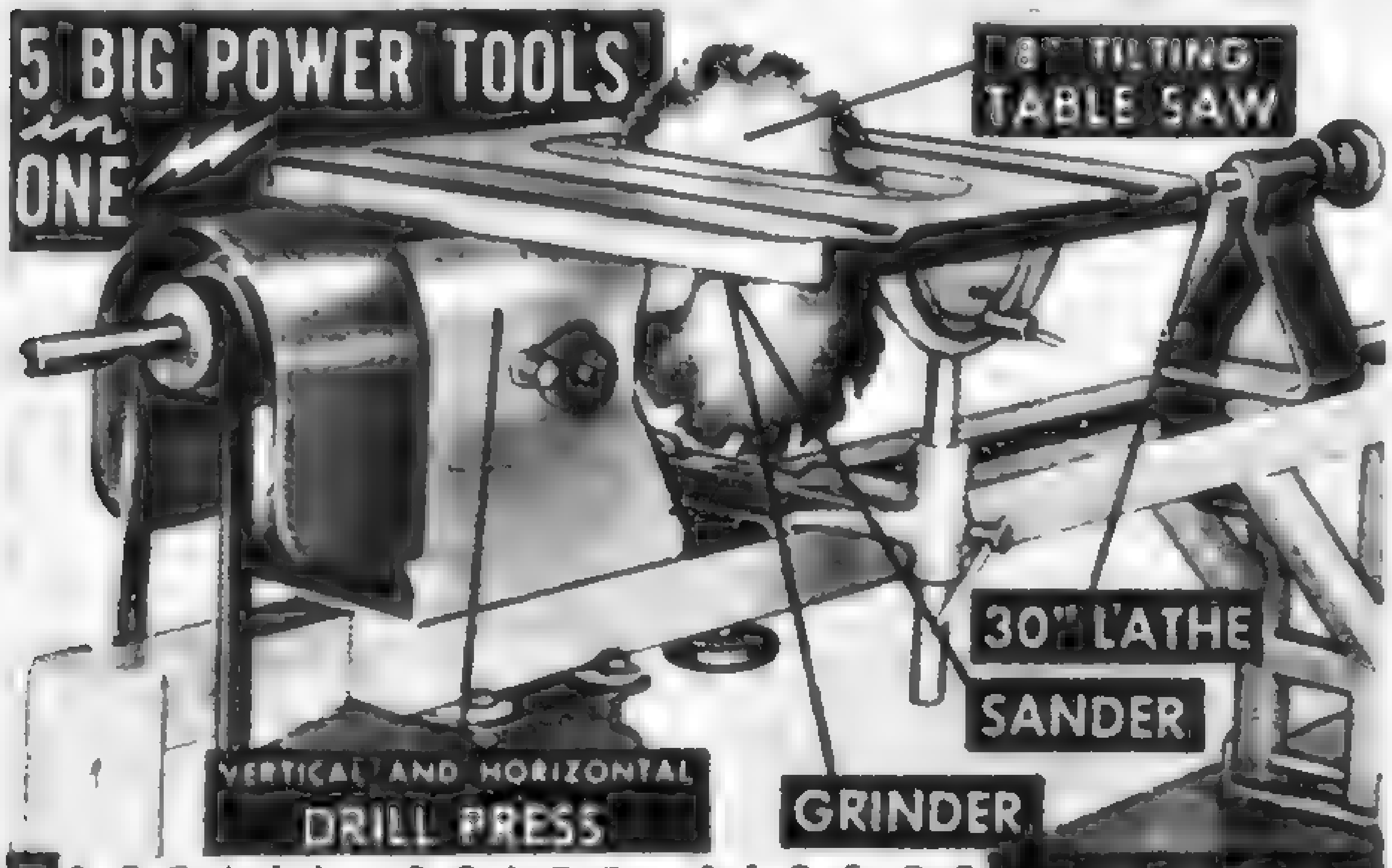

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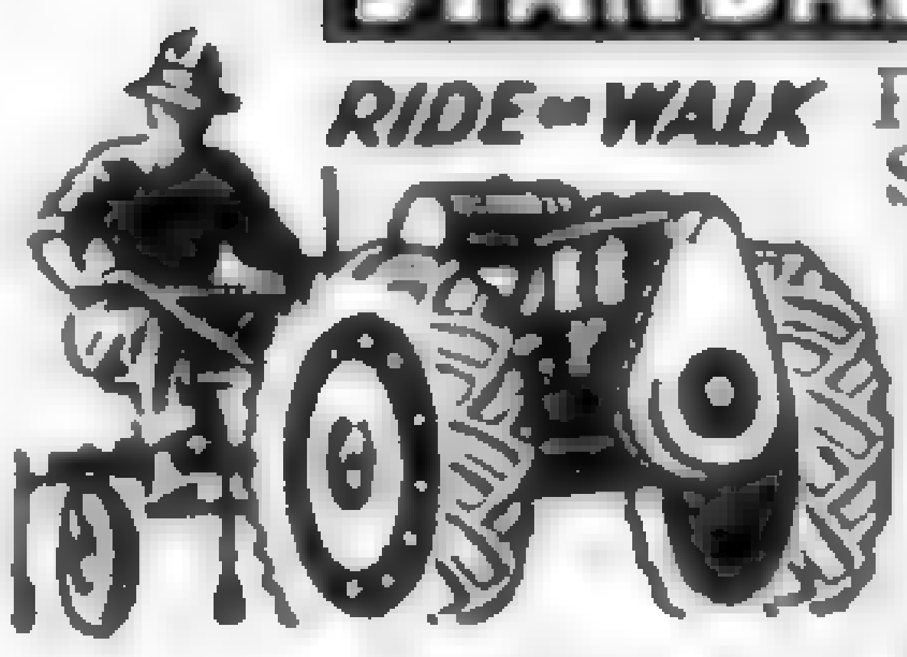

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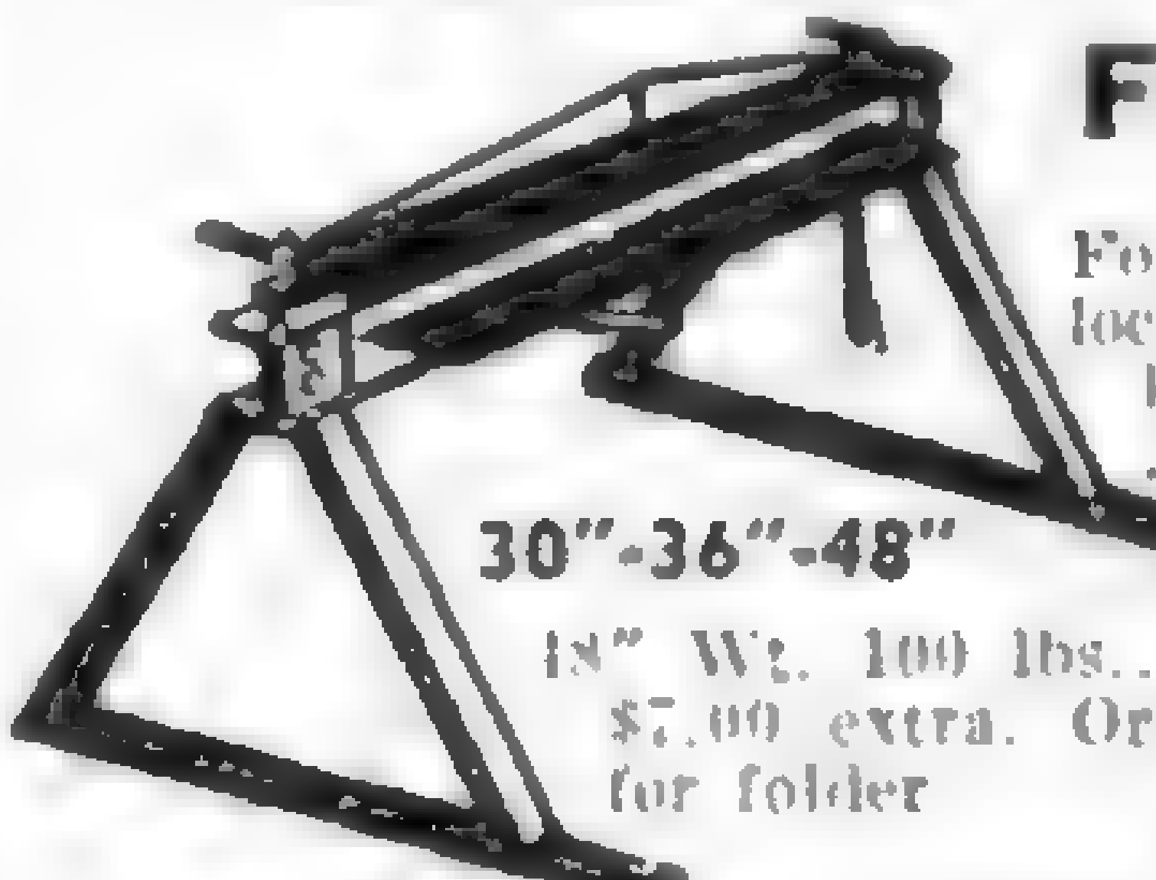

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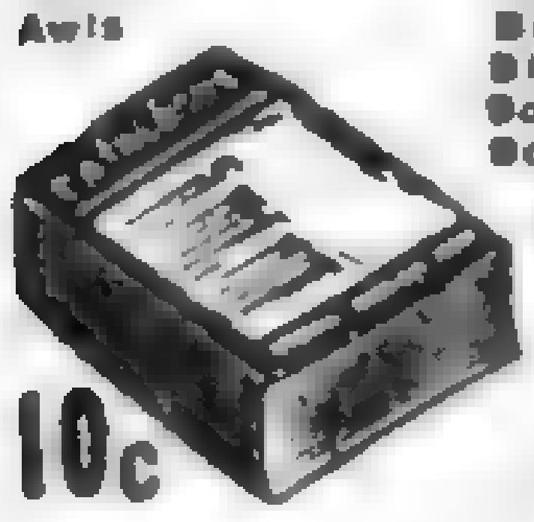

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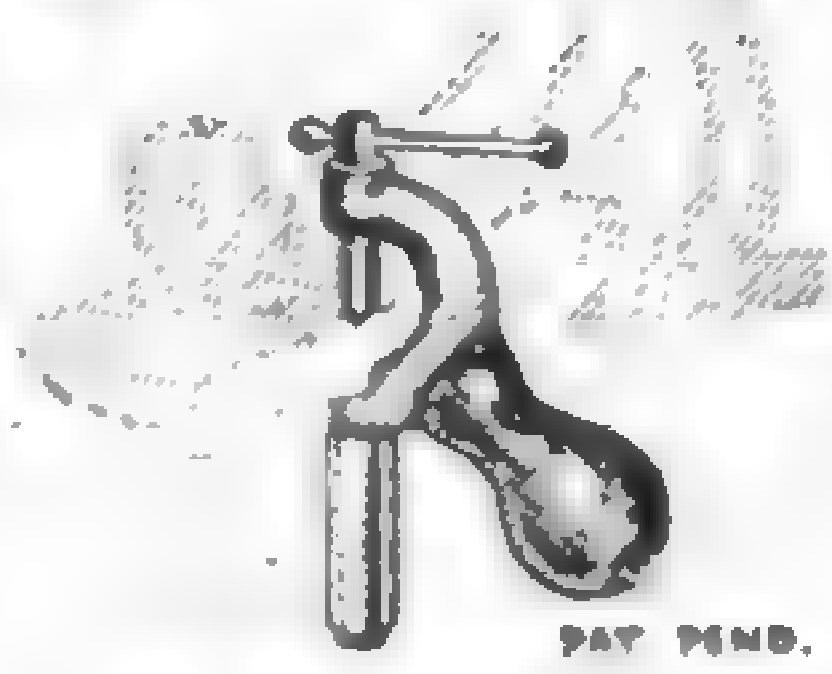

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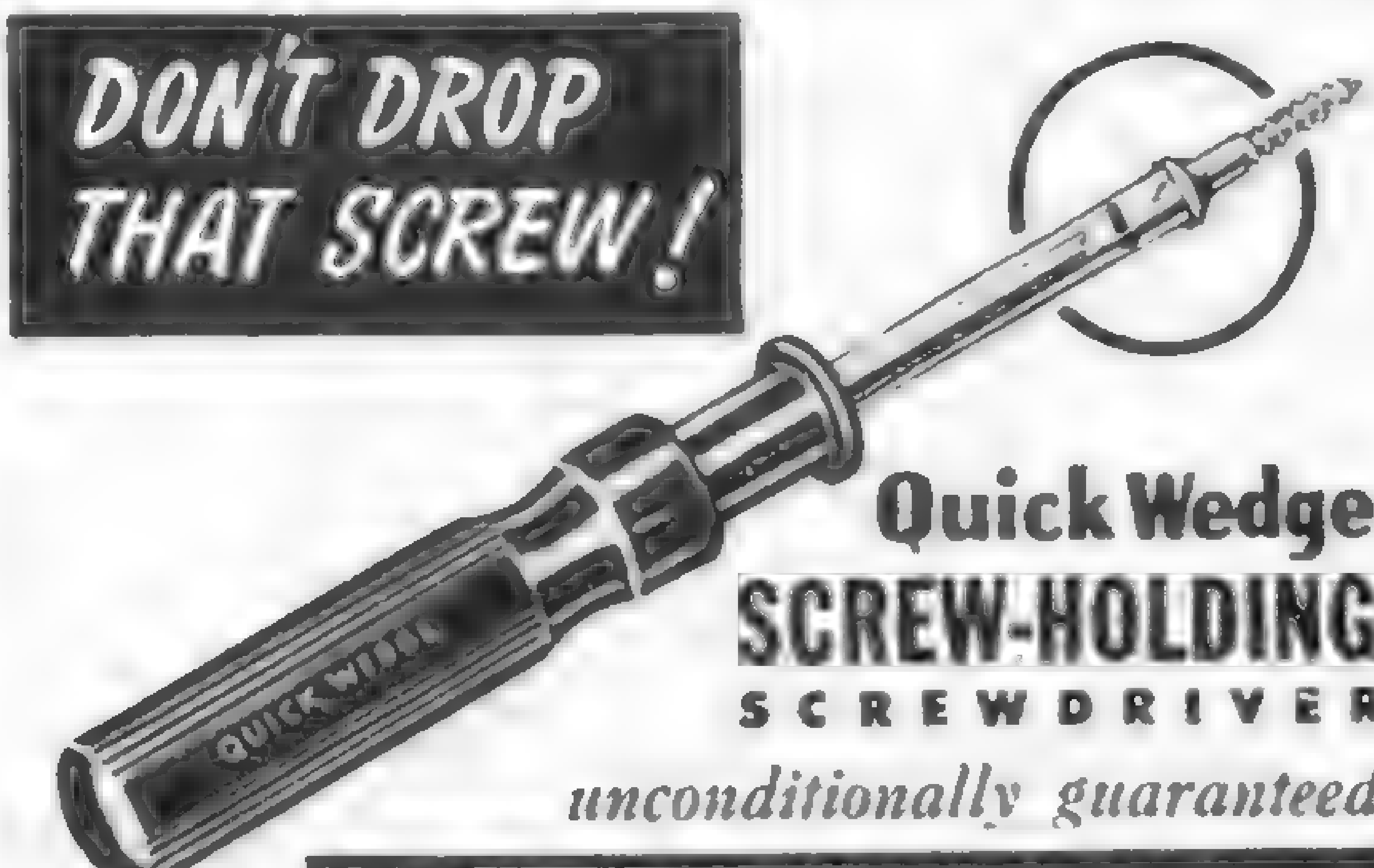

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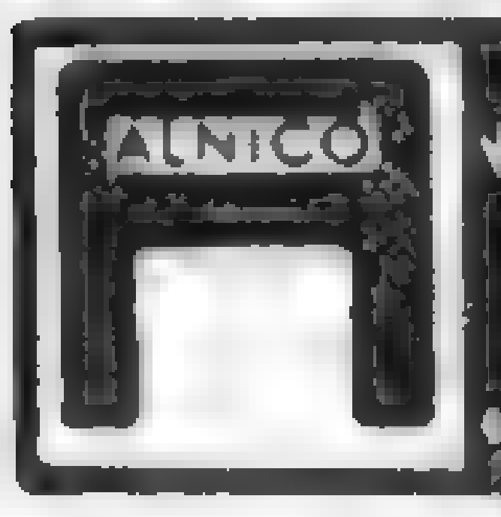

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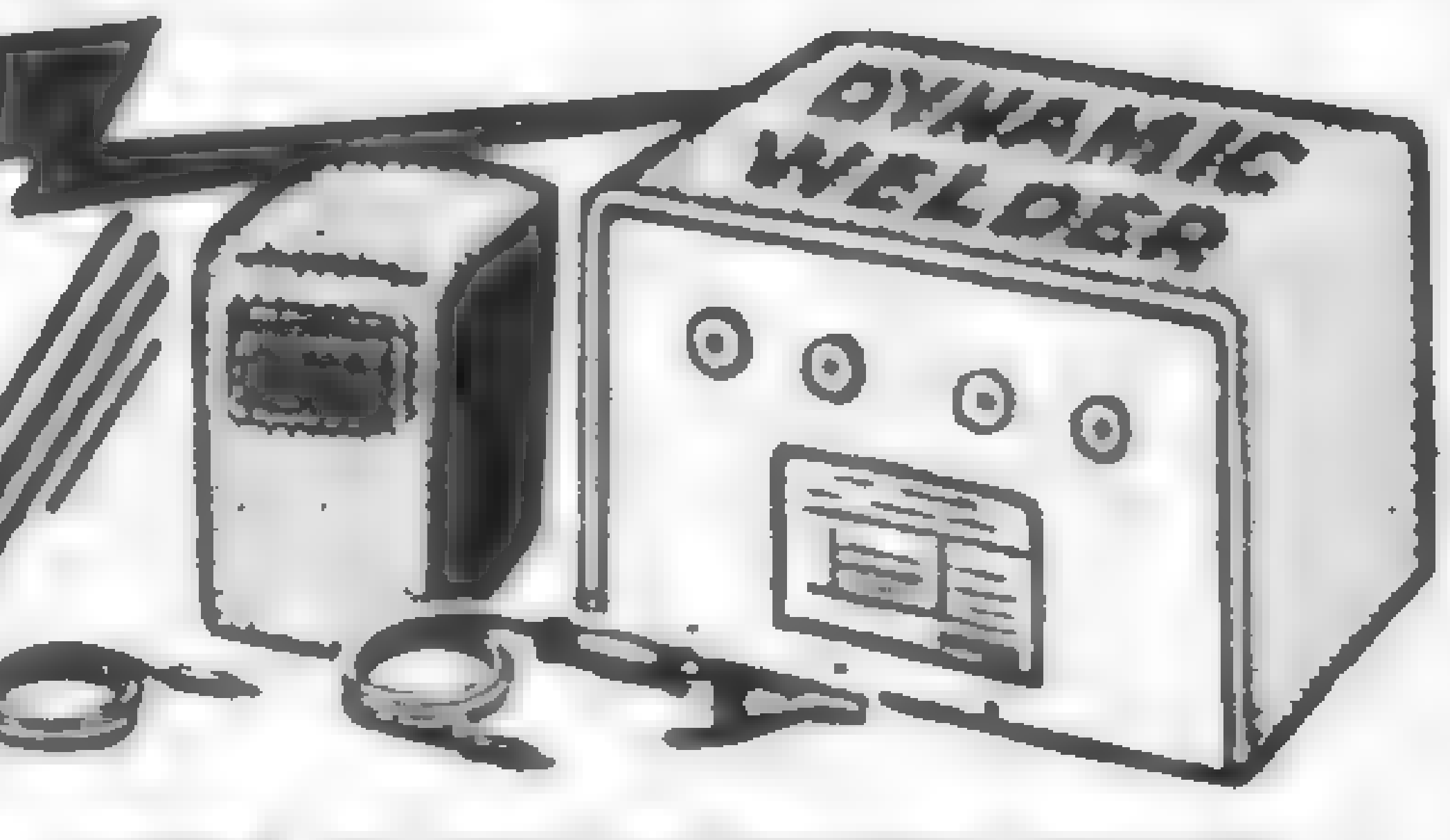

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Telescope Maker's Page

[*Continued from page 159*]

not, examine it very carefully. You may find that it fits rather snugly in its cell. Apply a little solvent around its edge, stuff a clean handkerchief or some lens tissue under the lens. Turn the gunsight over again and tap it lightly all around. The lens should now slide out. Be careful with this particular lens, it is a double concave and chips rather easily because of its sharp edges. Lens No. 4 presents no problem, simply repeat as you did with lens No. 1. You will notice that lenses 2 and 3 are coated and that they fit snugly only in one position.

Place the empty gunsight in a vise and with a hack saw take a light cut on the narrow side of the collar. Cut it off square, file down any irregularities, and there is your cell. Place lenses 2 and 3 into this cell. Then insert the retaining ring but do not screw it in too tightly.

Determine the focal length of your object by focusing the image of the sun on a white card. Having determined the focal length, the next step is to construct or buy a tube of aluminum or galvanized iron. Fit the tube to the cell as shown in the drawing.—Philip Weingarten

Breakfront Bookcase

[*Continued from page 108*]

quarter-round molding about 2 in. from the back with the curved side facing outward.

For the light oak finish used here, stain was applied with a cloth and allowed to stand for an hour before wiping. It was then allowed to dry overnight. Two coats of Simonize furniture polish were rubbed on, with each coat buffed to a high gloss with a buffing cloth on the disk sander. If you want to paint the unit, give two coats of yellow shellac to seal the wood completely. •

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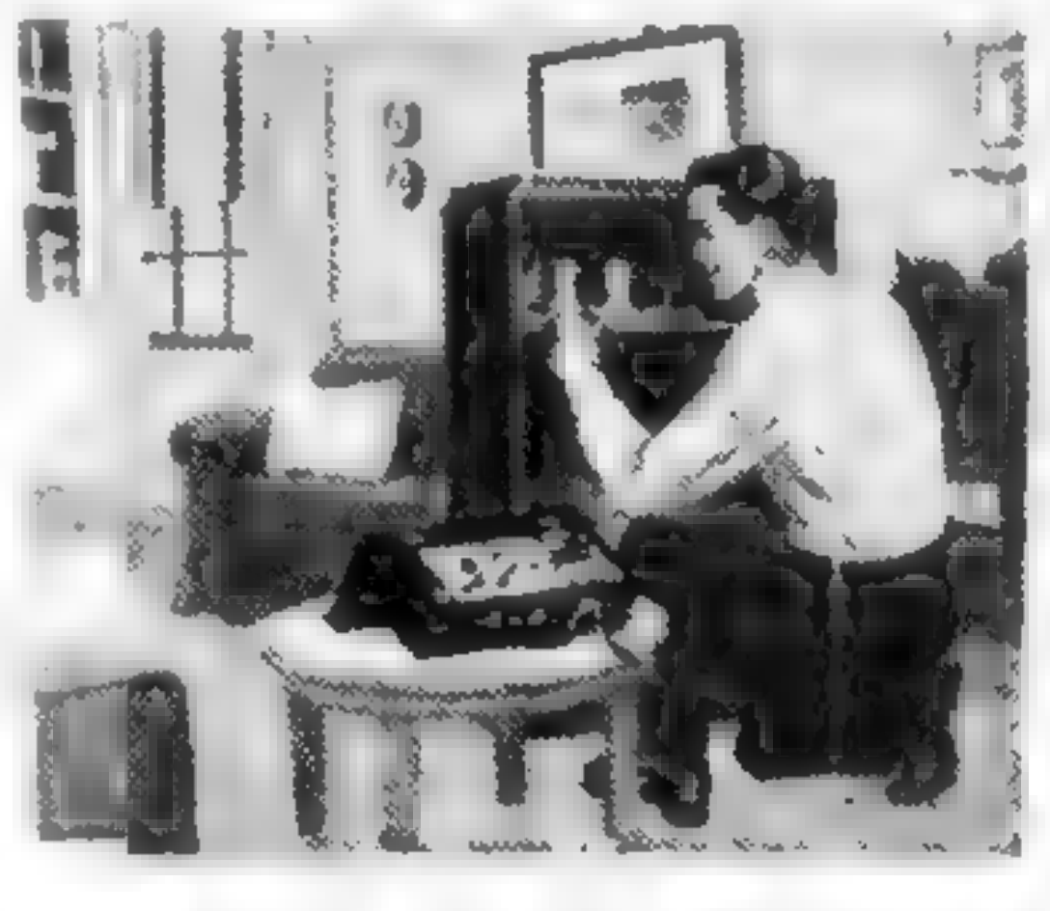

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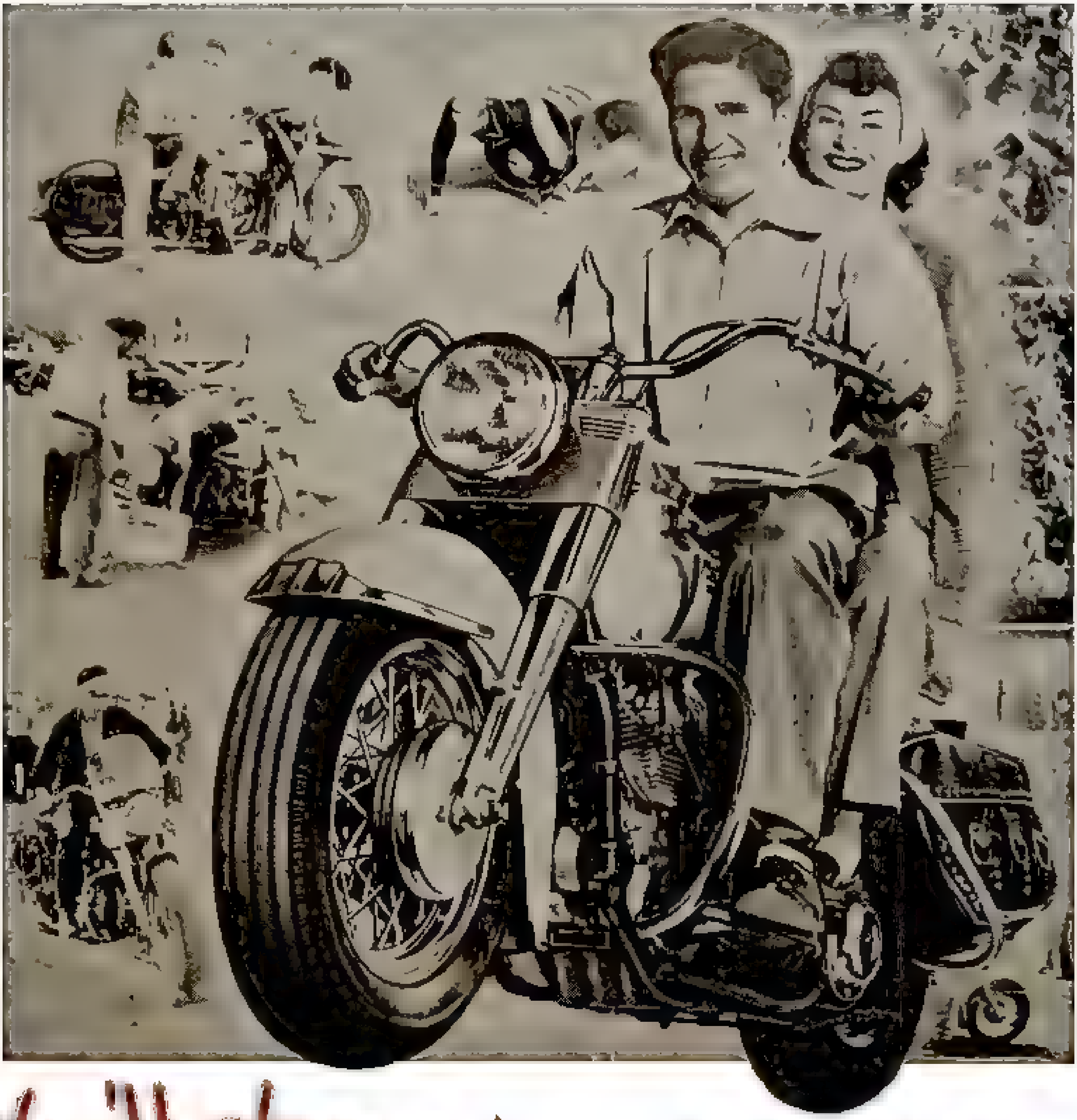

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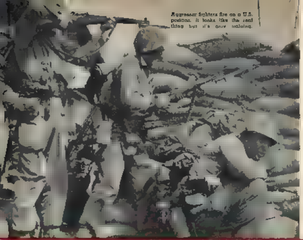


Aggressor fighters fire on a U.S. position. It looks like the real thing but it's only training.

This is the real thing. Here Aggressor-trained American Marines fire on the retreating enemy in North Korea.

AGGRESSOR TRAINING Pays Off In Combat

[illegible]

By James Nevin Miller

AN excited Puerto Rican w[illegible] [illegible]hed the sleeve of the American infantry captain and pointed to a man wearing a [illegible] green uniform, three gold leaves on each shoulder and a high comb helmet.

"[illegible]" she said. "That man [illegible] He [illegible] like an enemy."

"You've guessed right, Senora," replied the captain. "He is [illegible] U. S. Army [illegible] enemy."

For [illegible] past [illegible] years [illegible] has been plaguing our military high command. Not once but ten times it has struck with great power and cunning in gigantic air and amphibious assaults on our most carefully guarded hemisphere defenses. Thrice it has penetrated Alaska and in addition has invaded strategic positions from Hawaii to the Caribbean to Germany and from California to Florida.

Who is this foe who always invades and forever threatens? He's part of the Aggressor Force created by the U. S. Army to make field maneuvers more realistic.

In 1946 the [illegible] forces [illegible] was [illegible] by the Sixth Army. This was Exercise [illegible] Camp Pendleton, C[illegible] Aggressor demonstrated his worth as a training aid.

A[illegible] 1947 a regular Aggressor Force was developed at Fort Riley, Kan., for use as a mythical enemy in the field. It was planned that the personnel would change after each operation but the basic identity of the Aggressor [illegible].

[illegible] Aggressor nation, its ideology and political history were carefully worked out. Even a [illegible] forces, including field manuals, was planned.

Army clothing was dyed green and with the addition of colored cloth tabs and adaptation of U. S. insignia (such as the use of the crossed sabres of the cavalry to denote rank) [illegible] Aggressor [illegible] addition of a wooden "comb" to the U. S. helmet liner gave it a peculiar silhouette which further set the mythical enemy apart.

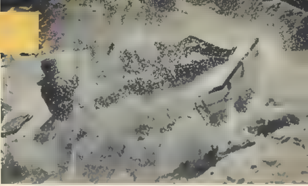
Regular Aggressor equipment was provided. It included full-size inflatable rubber models of U. S. guns, tanks, half-tracks, armored cars, trailers, Aggressor airplanes and other [illegible] to American equipment.

[illegible] some devices were developed [illegible] flash [illegible]. These included artillery [illegible], firecrackers which [illegible] and land-mine detonations, simulated hand grenades and [illegible].

With this equipment the relatively few Aggressor forces can simulate a much larger army. Incidentally the enemy is ge

World's Toughest Boat Race

This section of Wind River Canyon looks peaceful enough if you're not trying to shoot the rapids in a flimsy boat



Second place winners A. K. Reynolds and Mike [illegible] made [illegible] a boat used on the Green River [illegible]

Try entering this Wind River classic—but only if you have a wreckproof craft and a reckless nature.

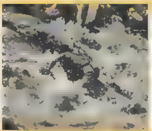
By A. D. Nunn

TO hell [illegible] the [illegible] rock [illegible] Hed [illegible] chance [illegible] the race in which he [illegible] rapids of the furious [illegible] known as Wind River.

The [illegible] the [illegible] White Water Boat Race sponsored by the Hed [illegible] Thermopolis, Wyo. [illegible] Reynolds was [illegible] and [illegible] in [illegible] race wh[illegible] boat [illegible]

The rapids of Wind River [illegible] white water [illegible] but white water [illegible] with [illegible] heavy [illegible]

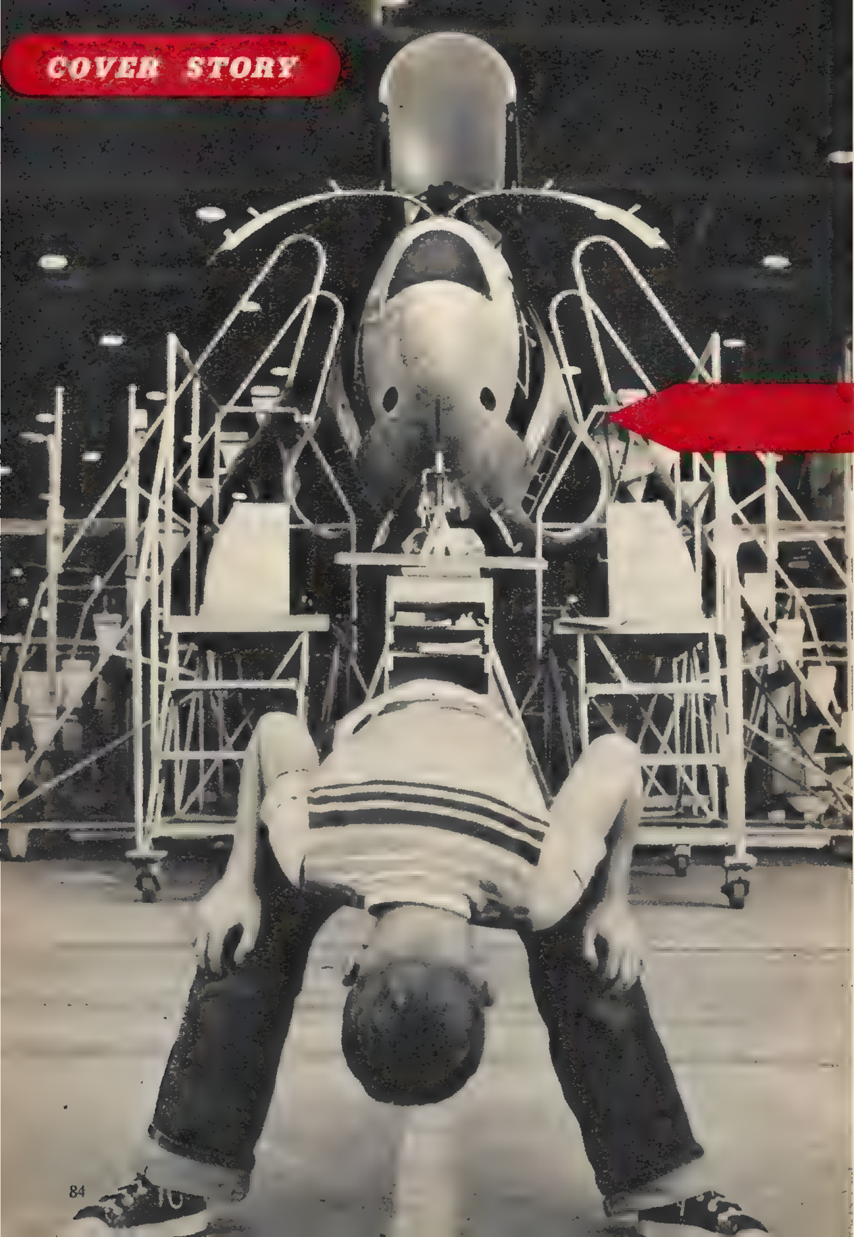
Hollywood stunters Mr. and Mrs. Buell Johnson rig their boat in preparation for the run

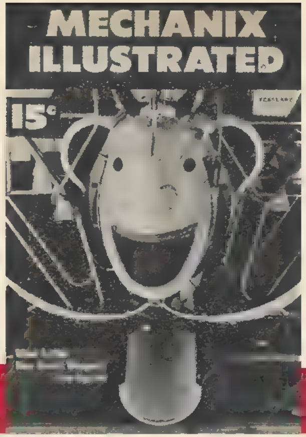


Believe it or not, Tommy Hedd managed to finish the hazardous race although he didn't win a prize

Winners [illegible] Aubrey [illegible] A. [illegible] Blanton [illegible] E. [illegible]

COVER STORY





America's only jet trainer, the T-33, gives student pilots the feel of handling a 600-mph aircraft.

Everybody gets a big kick out of the Big Yak. On the opposite page is a rightside-up shot of our upside-down cover picture of the jet plane, left.

Jet Fighter With a Face

AN assembler on Lockheed's T-33 production line bent over to pick up a speed wrench and suddenly burst out laughing. When he wiped his eyes and got his breath, he pointed to the nose of the first ship in the line.

"Look at that plane upside down," he gasped. "It's America's answer to Russia's Yak—the Big Yak!"

From that day on, the assemblers affectionately referred to the T-33 as the Big Yak, a nickname that has a meaning beyond reference to its funny nose.

For the Big Yak is America's only twin-seat jet training plane, the model in which fighter pilots of the United States Air Force are learning combat flying and the care and handling of jet planes.

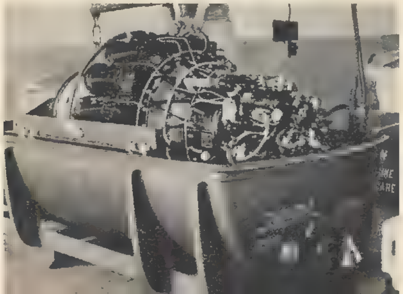
Power plant of the T-33 is the same Allison Model 400 that powers the F-80C combat plane. The 4600-pound thrust engine has an electronic starting device.

Its dimensions are approximately those of the prototype, the F-80 Shooting Star. Both have the same 38-foot, 19½-inch wing span but the new fuselage measures 37 feet 8⅜ inches instead of 34 feet ½ inch.

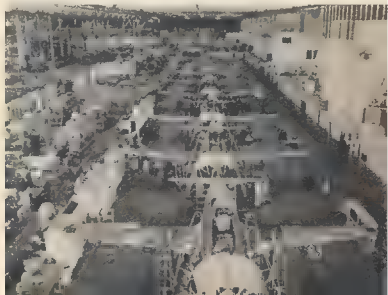
Only unrestricted performance data available now is the maximum speed (580 mph), stalling speed (117 mph), rate of climb (5525 ft. per min.), service ceiling (40,000 ft.) and range (1345 miles).

This ship with the grinning upside-down face is today turning out jet fighter pilots to insure American air supremacy. Yes, the Big Yak is really having the last laugh. •

Jet engines come in cans. Here's one with its lid off ready for removal and installation in a T-33.

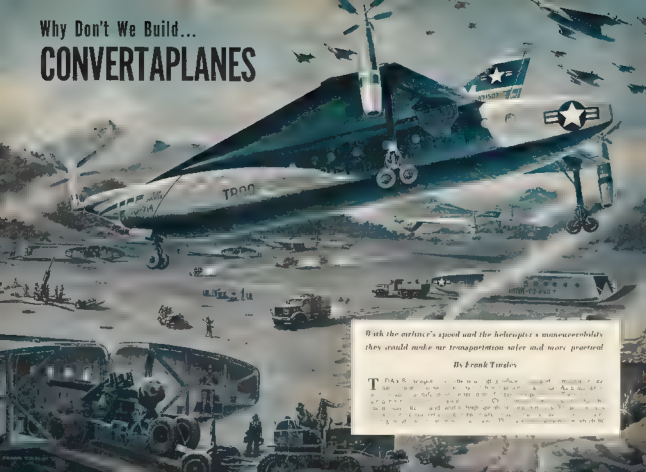


At the Lockheed plant in Burbank, Cal., the T-33 production line is parallel to the F-94 assembly line.



Why Don't We Build...

CONVERTAPLANES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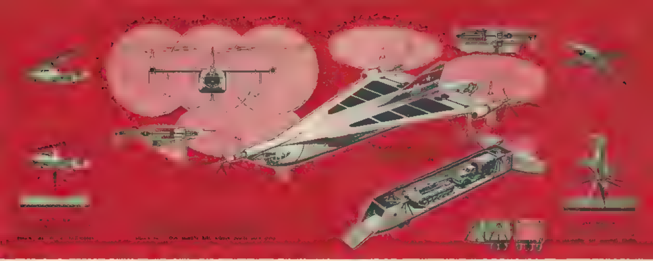
FRANK TINSLEY

With the airliner's speed and the helicopter's maneuverability they would make air transportation safer and more practical

By Frank Tinsley

TODAY'S transport [illegible] ... As [illegible] ... and a high speed [illegible]



per cent of all air accidents occur. Then, too long runways are expensive. They take one of the biggest single bites out of your air-travel dollar. And the land area required for this criss-cross complex of concrete pushes the airport so far out of community centers that time gained in flight is lost in field-to-town travel. In short, today's airplane may be fast and comfortable but it is expensive in ground time and space, and not nearly as safe as we would like to have it.

The helicopter, on the other hand, solves all of these problems. It is the only aircraft that carries its own, built-in parachute and it lands at practically zero ground speed on the proverbial dime. It can buzz right in over a field at cruising speed and altitude, hover as long as necessary, then descend vertically. It touches down on terra firma under full flight control as slowly and lightly as a feather and in little more space than the diameter of its own rotor. There are only two faults with the present day helicopter. Its range is short and compared to the airplane, it is slow as molasses.

Why, then, can't we have a fast-flying, slow-landing transport that can convert in flight from helicopter to airplane and back again? The answer is that such a plane is on its way. Despite the inertia that retards all new concepts and notwithstanding the knotty technical problem involved, the logic of the convertaplane can't be denied.

Back in the thirties Gerald P. Herrick of New York, often called the father of the convertaplane, built and flew successfully full-scale prototypes. They were biplanes whose pylon-mounted upper wings could be unlocked and spun as auto-gyro rotors. His latest model, a low-wing pusher plane, is fitted with an upper rotor-wing driven by small jet engines mounted on its tips.

A later method of conversion is a bit more startling. A missile-like aircraft, equipped with stub wings, rotor propellers and folding, tripod-like landing gear on its tail, takes off from a vertical position. Upon reaching altitude, it rolls over into a horizontal attitude and becomes a wing supported airplane.

A third variation probably will prove to be the most practical method of conversion. In this type, the convertaplane resembles a conventional air transport fitted with huge, slow turning propellers. Conversion is accomplished by rotating the engines and their props in a quarter-circle from the vertical to the horizontal axis of thrust.

In the design shown here the most advanced ideas have been used. Triple gas-turbine power units are arranged in a triangle for balanced suspension. Passengers, cargo [illegible] are carried in a separate body or "pod" locked beneath the wing. Fitted with quick release attachments, the pod [illegible] detached [illegible] from the parent plane [illegible] and handled on the ground [illegible] truck and contains its own retractable wheel gear.

The pilot's compartment is placed in the convertaplane's nose with full vision forward, up and down. The wing is fitted with "elevon" combination control surfaces. Its triangular plan structure is tremendously strong and rigid, providing ample support for the [illegible] power units [illegible] with [illegible] landing gear.

In horizontal flight, the forward power unit functions as a tractor propeller and the rear pair as pushers. The latter are fitted with standard controllable-pitch devices and as they rotate, blade angles are automatically changed from full push to zero and then to full pull whereupon they become tractor rotors lifting upward. While this is taking place, the forward rotor which requires no blade change maintains the convertaplane's speed.

Last September, the Air Force and Army opened a design competition for convertaplanes. Specifications for military models have been distributed. At last, the pioneers of this new form of flying machine can go ahead with the promise of government support. And Uncle Sam will be the first to blossom forth with an air-transport service that is convenient, speedy and safe! ■

coons by moonlight

You have to be sure-footed and tough to roam the black woods for raccoons. And a bit crazy, too

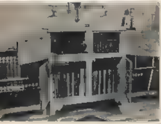
By Raymond R. Camp
Rod and Gun Editor, N. Y. Times

REGARDLESS of what some hunters say, you [illegible] have to be crazy to hunt coons, but it helps.

One middle-aged sportsman, when his [illegible] was [illegible] his bird dogs had [illegible] and [illegible] attention was [illegible] with a definition of coon hunter. A former fox hunter [illegible] This definition has some [illegible] flaws, however, for I know any number of men who hunt foxes by day and coons by night and [illegible] enjoy the sport [illegible] regular [illegible]

After [illegible] first [illegible] a [illegible] follower of the sport or you [illegible] of the wary raccoon. The requirements [illegible] are rather simple, provided you happen to be within reasonable distance of woods inhabited by [illegible] and you'll find almost any large forest in the [illegible] range area meets this qualification. Now that [illegible] no longer [illegible] a coonskin coat a [illegible] part of his college wardrobe and [illegible] "[illegible] look," the raccoon has increased his range and abundance.

First you must have a dog or a couple [illegible] a man [illegible] hounds that he says are coonhounds. Almost any hound will [illegible] but a really good coonhound is about as difficult to find as a good grouse

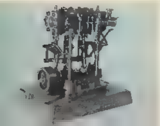


WORKBENCH AWARD Winners

EACH of the craftsmen whose projects are pictured here will receive a $5 check and a Workbench Award certificate. How about sending us a photo and brief description of your latest project? Even if your work isn't one of the winners, it may also receive a Certificate of Merit. Photographs of your workshop are also eligible for an award. Send your entry to MECHANIX ILLUSTRATED Workbench Awards, 67 West 44th Street, New York 18, N. Y.

Radio-Phonograph. Robert Elford of Hamilton, N. Y., is justifiably proud of this fine piece of cabinetry. These three units were constructed of butternut wood, finished with three coats of varnish and rubbed down to satin finish with pumice and water.

Model Clipper. A fine job of modeling by David P. Hammond of Chincoteague, Va. It was built in a year of spare time from a kit. The ship, a Baltimore clipper of 1812, is 20 in. long and represents Mr. Hammond's very first attempt at model making.



Working Marine Engine. A superb example of metal-working built by Carlton Nelson of Hartford, Conn. It contains 396 parts and will turn over on 15 pounds of steam, obtainable from a pressure cooker. A labor of love, it took seven years to make.

Curtiss Hawk. This model, built by Dennis Locke of Brampton, Ont., originally appeared in Mechanix Illustrated's [illegible] 1949 issue. It is powered by a Class B (glow plug) engine and a nine inch two-bladed propeller. A fine paint job, too.

SUNDAY
PAPERS

Bike Trailer. Mike Daugherty and his father, of Marietta, O., built this handy trailer to help Mike on his paper route. It is made of a candy box, scooter wheels and black iron pipe. In no way does it interfere with the regular action of the bike.

Model A Sportster. Leroy Bankert of Hanover, Pa., cannibalized a Cadillac fenders and grill, a Chevrolet for the hood, a Lincoln for bumpers and a Hudson for a tail light. Basic framework consists of a Model A Ford. Project cost around $500.

Rondele II. Built by Phil Kennedy of Las Vegas, Nev., from MI Plan No. 388. The deck is of solid mahogany with the cockpit upholstered in red leather. Mr. Kennedy writes that the boat handles beautifully and has been clocked at a speed of 48 mph.

Allen head bolts [illegible] into socket wrenches [illegible] the threaded section and [illegible] the remaining shank end to take a [illegible] of suitable diameter. Taper the heads as shown above.

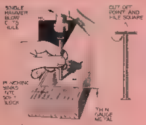
You can avoid [illegible] fire hazards by using the pressure plate from an old film pack as a soldering iron stand. Bend the [illegible] form legs. The spring [illegible] keep your iron in position.

Spatter stopper. [illegible] spraying that occurs when you close a can of paint by merely spreading a rag over [illegible]. A few [illegible] and [illegible]

Going straight. A [illegible] has been [illegible] while being driven [illegible] being [illegible] By gripping the [illegible] pliers you can drive [illegible]

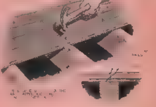
Craftsman's Corner

By grinding off the business end of a spike you'll have a fine punch for use on thin-gauge sheet metal. One sharp hammer blow will leave a neat disk embedded in the wood block on which you rest the work.

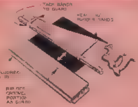


SINGLE HAMMER BLOW CUTS HOLE
CUT OFF POINT AND FILE SQUARE
PUNCHING SINKS INTO SOFT BLOCK
THIN GAUGE METAL

A mitered joint [illegible] than an ordinary [illegible] joint when used in flooring. In this manner the [illegible] rest on a solid support. A dab of glue in addition to the [illegible] ease [illegible]

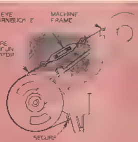


A saw guard that will protect both you and the blade can be [illegible] about an inch off the grooved edge of a piece of flooring. Secure [illegible] bands [illegible]



TACK BANDS TO GUARD
RUBBER BANDS
FLOORING STRIP
RIP OFF GROOVED PORTION AS GUARD

Some power tools have [illegible] expensive [illegible] up [illegible]



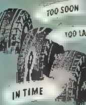
2 EYE TURNBUCKLE
MACHINE FRAME
WIRE ARO'UN MOTOR
SECURE

car care

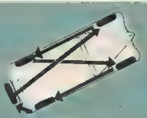
more mileage from your tires

By Frederick C. Russell

Spinner test is latest method of determining whether front wheels need balancing.



o you are going to recap your tires, do so when a slight trace of tread is still evident. See drawing.



A common method of rotating tires which includes spare. Right front tire gets most wear.

WITH tires again on the expensive side and [illegible] This time [illegible] Whether you ride over those four [illegible] working [illegible] ideas that should [illegible]

English [illegible] are such [illegible] letting [illegible] pressure on the [illegible] tires as if this were something [illegible] about punctures [illegible]

[illegible] bearing alignment [illegible] the car wanders [illegible] some of the ideas [illegible] during World War [illegible] most important steps [illegible] hand [illegible] better [illegible] of the [illegible] the wheel.

But [illegible]

[illegible] tire when it cools. Today this idea has been debunked. If you have been running around town and the car seems to be riding hard, get out your tire gauge and check pressure. Let us say the recommended cold pressure [illegible] is 25 pounds. Your gauge shows [illegible] has jumped to 30. You then drop pressure [illegible] 25 pounds [illegible] are permitted to drop the pressure [illegible] Here you [illegible] probably find that the pressures have gone to 32, perhaps higher. Drop them to 30.

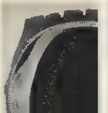
But be sure your gauge is accurate. It is wise to take two readings of each tire just to avoid error. And don't be surprised if the rear tires show more pressure build-up than the front ones. One tire manufacturer [illegible] some [illegible] which [illegible] have been exceptions.

As for [illegible]

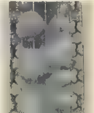
Continued on page 160

If the tire tread is badly worn in the center only it usually means continued overinflation.

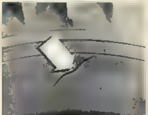
Continued underinflation means overheating will ultimately cause plies to separate.



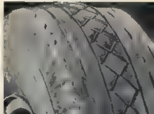
A tire that wears in spots may indicate an out-of-balance condition or brake fault.



Neglected sidewall cuts will surely result in blowouts. Temporary repair can be achieved by using rubber tire dough. Vulcanize as soon as possible.



Chronic underinflation will show up as tread wear on shoulder of tire. It is best to check pressure with your own gauge rather than gauge on air pump.



Common Faults In Making Movies

How to take movies worthy of a professional with your present 8 or 16mm equipment.

By Emil E. Brodbeck,
Author of Handbook Of Basic Motion Picture Techniques.

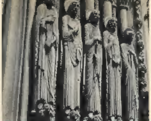
A motion picture is a film on which hundreds of still pictures have been exposed one right after the other. However, if each of these pictures is not well composed in itself, then the overall appearance of the whole movie scene in which they appear will also be poor.

Incorrect panning is moving the camera back and forth, up and down, while shooting motion pictures of a stationary object. This is also an apt description of one of the most glaring faults movie-makers develop almost from the first scene they shoot. Don't you make the same mistake and here's why.

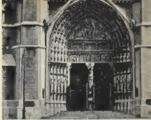
Hold a strip of movie film on which a pan scene has been made, up to the light and examine it. Do you have any idea as to what the cameraman was trying to show you, if not the motion picture which will result when these pictures are projected will be even worse.

Here's how the job should have been done. You should first take a good look at your subject, a church. You should note that the figures flanking the left wall of the doorway are both interesting and well lit. These figures then, are what you're going to lead up to.

First you get as far away as is necessary to show the whole church and some of its surroundings. You know you want to show the figures on the left wall of the main doorway. Your next shot should be of the whole doorway to show just where these figures are located. Finally come right up close and shoot a scene which shows the figures in detail. It is easy to see that the three scenes you now have are far superior to those pictures representing parts of a pan scene of the same subject. You made three separate scenes from three different angles and distances. You held your camera perfectly still for each scene. Thus your audience will get a well composed look at each view of the subject. Your film will make sense.



Get a good close-up for detail, this will add a lot of interest to your movie. Be sure to get a long enough sequence to be able to enjoy the subject.



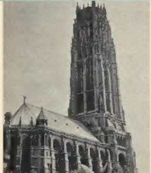
Tighten your tripod and shoot this scene, it should lead or follow your close-up to show the position of the figures as they are in the church doorway.

Unsteadiness when panning often is the result of holding the camera improperly. If you hand hold your camera your feet should be solidly placed, arms braced against the body, camera against the forehead. If possible, hold the breath for the duration of the scene. If you pan a moving object you'll find it will help tremendously to point your feet in the direction toward which the subject will go and toward your body as you follow the subject. In this way you end your pan in a comfortable position and with the camera pointing in the same direction as your feet.

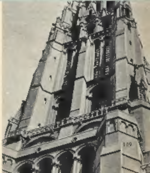
Except for beginning and end of a pan scene of a moving object, that object should be kept centered in your finder.

One reason not using the tripod is such a common fault is that so many folks get all tangled up in them. A trick of the trade is to make the two rear legs of the tripod the same length as each other while the forward leg is made about 1½ inches longer. When the tripod is put down, the longer leg rests on the ground first and leaves the two rear legs free so that you can pull them back and apart without their

You should always try to get far enough away from your subject to be able to get it all in for your main shot. Study the church to see when it is lit best.

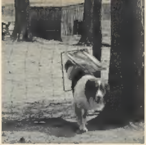


If you can not find room to get back and get a good overall shot, get separate details of different parts of the church. Don't swing and swoop your camera.



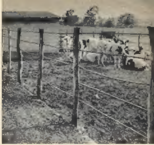
First Nation

Handy check protector can easily be made from one of the small corrugated rubber rollers that are used to prevent automobile windows from rattling. Ink it on a regular stamp pad and roll it across your check. This will make erasures stand out clearly and discourage tampering.



Dog gate. If you've ever had a dog that digs holes under your fences and lets the chickens out you will appreciate this gate that your dog can easily work himself. It consists of a metal flap that is hinged to the fence and can swing either way as the dog, not the chickens, goes either in or out.

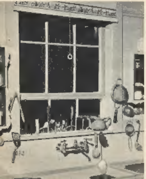
Flashlight battery protection. Spare cells should be protected by coating the positive poles with fingernail polish. This insulates the cell so that it cannot lose its charge when stored among metal tools or equipment on a trip. When you are ready to use a battery peel off the polish.



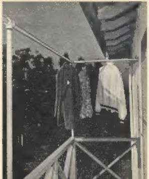
Tough fence. To keep the cost of repeated fence building down and still have a lock-up that will hold almost anything use steel rods, the type generally used to reinforce concrete. Set wood posts with holes drilled for five rods. Push the rods through the holes and weld the joints.

home hints

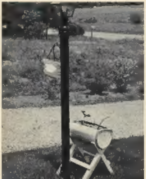
Window sill knife rack is a useful addition to any kitchen. It can be made to hold any assortment of knives and it is much safer than groping for them in a drawer. To make the slits, drill two holes and use a keyhole saw. Finish off with sandpaper. Removing sill is unnecessary.



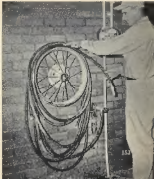
Overhead pipe rail is a splendid idea for airing clothes. Suits or dresses on hangers can be easily hung on the railing. It is also quite handy for airing blankets that usually pull down your clothes line. You might also quickly convert the railing into a support for a summer awning.

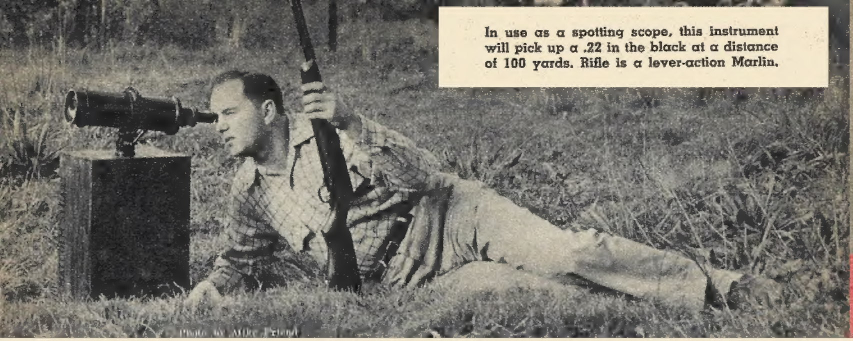


Nail keg flower boxes are only one of the many uses your empty kegs can be put to. This can be done by removing two staves to form a boat. Mount the open keg on a sawhorse made from scrap lumber, fill the box with dirt and plant your flowers. Paint it white or a light pastel color.



Hose holder that is both handy and easy on your hose can be quickly made by getting that old car wheel out of the cellar and bolting it to your garage wall or any other convenient place. Place it near a water outlet and you won't need to disconnect it. It will greatly prolong the life of a hose.





In use as a spotting scope, this instrument will pick up a .22 in the black at a distance of 100 yards. Rifle is a lever-action Marlin.

Photo by Mike Friend

The Amateur Telescope Maker's Page

Conducted by Robert Brightman

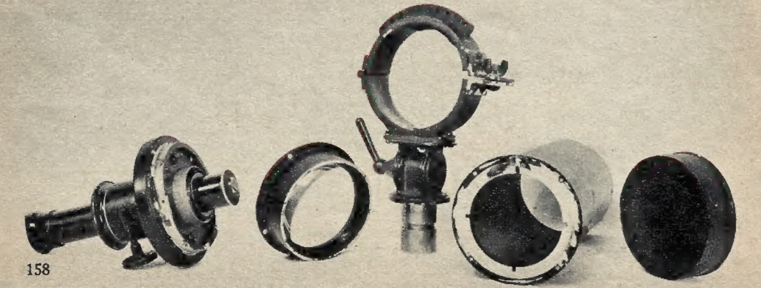
TO some people a telescope always means a refractor, instead of a reflector. This, despite the fact that the vast majority of amateur telescope makers always start out with the latter type of instrument as their first endeavor.

The price of a fine quality achromatic objective is usually the greatest deterrent for the average telescope maker when he starts considering the construction of a refractor. Obtaining a large diameter, short focus lens, suitable for use as a spotting scope or a richest field telescope has until now been well-nigh impossible, unless he has been willing to spend about $100 for such a lens. To this of course, must be added the cost of machining a cell and the construction of a suitable mounting.

One of our readers set out to see if he could lick the cost problem by searching the government surplus optical markets—and came out with a happy surprise. His letter follows:

> *The innocent looking Reflector Gunsight Mark II contains the components for a wonderful telescope. Every part of this gunsight can be used. The first two lenses make up an achromatic objective. The cell is made from part of the aluminum body and the mounting saddle from the reflector holder. I paid $25 for such a telescope complete with a storage box.*

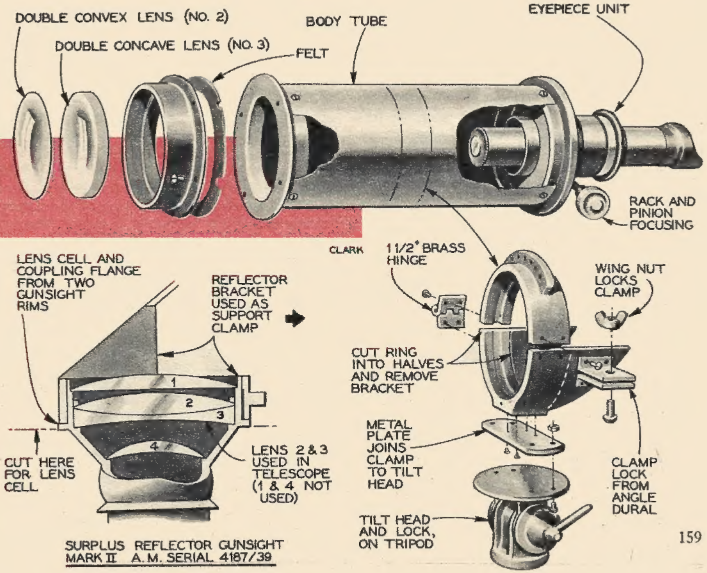
To get at the components below, dismantling of the gunsight should be done carefully. A solvent, such as carbon tetrachloride, should be used before attempting to remove lenses from cells.



The optical parts of the "surplus" instrument. It is known as a Reflector Gunsight Mark II.

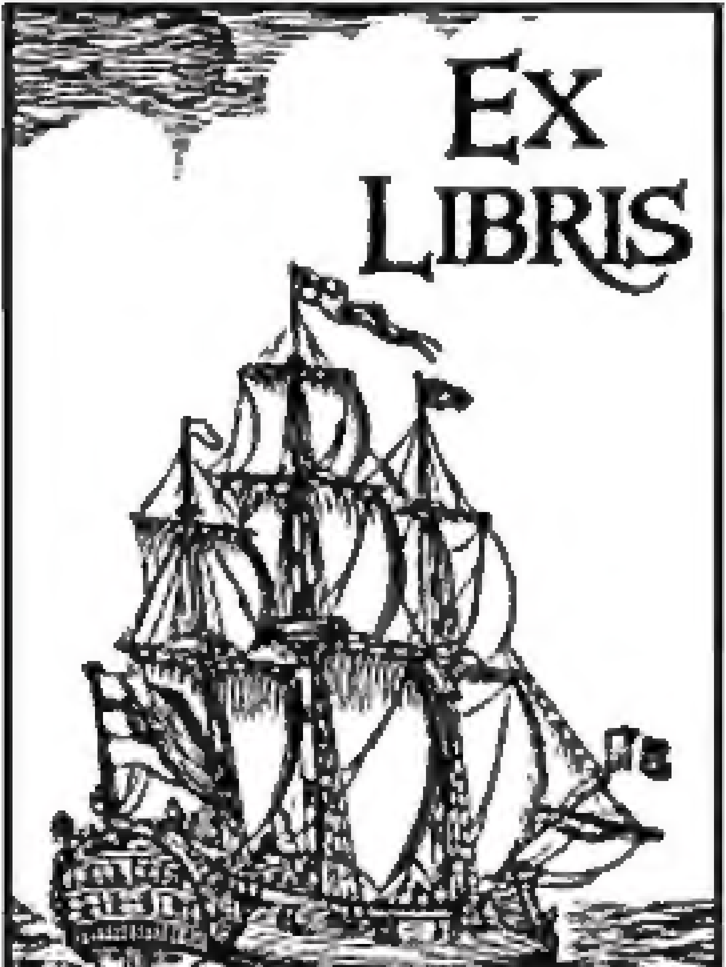
The completed telescope set up on a camera tripod. It has a 40° field of view and a power of 12x.

> *Dismantling the gunsight should be done carefully and with patience. Do not use strong arm tactics. First remove the glass reflector and its holder. Observe that on its large side it contains a convex lens. To remove this lens, dip a brush into a solvent, like carbon tet, and run it around the retaining ring holding the lens. The solvent loosens the cement which was applied at the factory to assure a weatherproof seal. After a while, tap the retaining ring lightly with the wooden handle of a screwdriver, then place the tip of the screwdriver into the notch on the retaining ring and tap lightly. The ring should loosen and you should be able to unscrew the retaining ring and thus remove the lens.*
>
> *Beyond this you will find another lens. It is a double convex lens which will form the first element of your achromatic objective. To remove this lens, repeat the same process as before.*
>
> *Now, then, after you have removed the retaining ring on this lens, turn the gunsight over very carefully and let lens No. 2 slide out slowly. If you are lucky, lens No. 3 will come out with it. If it does* [Continued on page 192]



DOUBLE CONVEX LENS (NO. 2)
DOUBLE CONCAVE LENS (NO. 3)
FELT
BODY TUBE
EYEPIECE UNIT
RACK AND PINION FOCUSING
CLARK
1 1/2" BRASS HINGE
LENS CELL AND COUPLING FLANGE FROM TWO GUNSIGHT RIMS
REFLECTOR BRACKET USED AS SUPPORT CLAMP
WING NUT LOCKS CLAMP
CUT RING INTO HALVES AND REMOVE BRACKET
1
2
3
4
CUT HERE FOR LENS CELL
LENS 2 & 3 USED IN TELESCOPE (1 & 4 NOT USED)
METAL PLATE JOINS CLAMP TO TILT HEAD
CLAMP LOCK FROM ANGLE DURAL
TILT HEAD AND LOCK, ON TRIPOD

SURPLUS REFLECTOR GUNSIGHT MARK II A. M. SERIAL 4187/39



Anon. Malefactor